UNIVERSITY OF CAPE TOWN
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UNIVERSITY OF CAPE TOWN

RESEARCH & INNOVATION HIGHLIGHTS

2019–20

CONTENTS

RESEARCH
GUIDED BY SUSTAINABLE DEVELOPMENT GOALS

Throughout this publication you will see the icons below, referring to the 17 United Nations Sustainable Development Goals (SDGs).

UCT is committed to finding solutions to complex problems to help build a sustainable global future. As a result, a great deal of our research is closely aligned to the SDGs, and we continue to make a significant impact toward achieving those goals, as can be seen by the SDG-tagged content of this publication.

UCT believes it is critical that all leading research institutions advance these goals, particularly those on the continent, which is deeply affected by many of the challenges the SDGs aim to meet.

No poverty

Zero hunger

Good health and well-being

Quality education

Gender equality

Clean water and sanitation

Affordable and clean energy

Decent work and economic growth

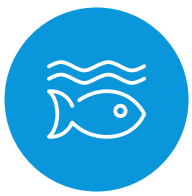
Industry, innovation and infrastructure

Reduced inequalities

Sustainable cities and communities

Responsible consumption and production

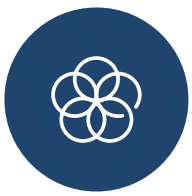
Climate action



Life below water

Life on land

Peace, justice and strong institutions



Partnerships for the goals

2019-20 IN NUMBERS

A RESEARCH DASHBOARD

WORLD UNIVERSITY RANKINGS

1st IN AFRICA

UCT is first in Africa, holding the following places in world rankings

155th **IN THE WORLD** THE 2021

103rd **IN THE WORLD** US NEWS

220th **IN THE WORLD** QS 2021

268th **IN THE WORLD** CWUR 2020-2021

EMERGING ECONOMIES

UCT holds 10th position in Emerging Economies University Rankings of the THE 2020

SUBJECT RANKINGS

TOP 10

Development studies

10th IN THE WORLD

QS 2020

Infectious diseases

9th

US NEWS 2021

TOP 100

Clinical, pre-clinical and health

65th IN THE WORLD

THE 2020

Social sciences

92nd IN THE WORLD

THE 2020

TOP 75

- Mining and mineral engineering
- Public health

GRAS 2020

TOP 100

- Clinical medicine

GRAS 2020

TOP 100

- Anatomy & physiology
- Anthropology
- Archaeology
- Architecture/built environment
- Geography
- Medicine

QS 2020

TOP 100

Immunology

56th IN THE WORLD

US NEWS 2021

Microbiology

72nd IN THE WORLD

US NEWS 2021

Social sciences and public health

73rd IN THE WORLD

US NEWS 2021

TOP 50

Public, environmental and occupational health

36th IN THE WORLD

US NEWS 2021

Immunology

47th IN THE WORLD

US NEWS 2021

Oceanography

48th IN THE WORLD

GRAS 2020

KEY TERMS

ARWU Academic Ranking of World Universities

CWUR Center for World University Rankings

GRAS ShanghaiRankings' Global Ranking of Academic Subjects

QS Quacquarelli Symonds

THE Times Higher Education

US NEWS US News Best Global Universities

2018 PUBLICATIONS

1 826.56
Publication count (units)*

14
NUMBER OF BOOKS

189
NUMBER OF CHAPTERS IN BOOKS

R226 million
Subsidy income: publication

3 232
NUMBER OF JOURNAL ARTICLES

3 163
NUMBER OF AUTHORS (ALL OUTPUTS)

251 Number of conference proceedings

513 NRF-RATED RESEARCHERS

12%

The National Research Foundation allocates ratings based on a researcher's recent research outputs and impact, as perceived by international peer reviewers. 12% of the country's rated researchers are at UCT.

36 A-RATED RESEARCHERS

29%

A-rated researchers are international leaders in their field. About 30% of the country's A-rated researchers are at UCT.

43 SARChI CHAIRS

18%

Department of Science and Technology/National Research Foundation South African Research Chairs are designed to strengthen the ability of the country's universities to produce high-quality research, innovation and students. Nearly 20% of the country's SARChI Chairs have been awarded to UCT.

INCOME

R1.64 billion external research income in 2019

R302 million postgraduate funding (all sources)

R79 million funding for postdoctoral fellows

* The publication figures are for accredited (subsidy-generating) outputs only published in the preceding year. Latest figures available at the time of going to print: September 2020.

An array of dynamic women scientists in white lab coats shared their research with passersby at the V&A Waterfront on 28 September 2019. The first event of its kind in South Africa, Soapbox Science offers researchers – focusing on women – a platform to connect with and educate the general public about their work.
UCT contributed five of the nine presenters at the Cape Town event.

2019 Contract research

2 163
research contracts signed

RESEARCH CONTRACT VALUE
R1.77 bn

VALUE OF FOREIGN RESEARCH CONTRACTS SIGNED
R1 190 m

VALUE OF LOCAL RESEARCH CONTRACTS SIGNED
R579 m

IP protection

INVENTION DISCLOSURES
52

PATENT APPLICATIONS FILED
66

PATENTS GRANTED
37

2019 Innovation

LICENCE INCOME
R1.8 m

EQUITY IN SPIN-OFF COMPANIES
13

LICENCE AGREEMENTS (OUTBOUND)
23*

25 Spin-off companies to date

1 NUMBER OF SPIN-OFF COMPANIES STARTED IN 2019

191 Active IP rights to date

21% active portfolio commercialised

46% relate to human health

*Includes option and assignment agreements

CLICK HERE TO READ MORE in *Innovation at UCT 2019*

AWARDS, GRANTS & ACCOLADES

In this section

01 UCT rises in research rankings

UCT's outstanding research was reflected in the 2021 US News & World Report Best Global Universities rankings.

UCT moved from 121st to 103rd position and ranked in the top 100 for six subjects, including a top 10 ranking for work in infectious diseases.

Said Professor Sue Harrison, UCT's deputy vice-chancellor for research and internationalisation, "We're delighted with UCT's performance, which really does reflect our research community's commitment to excellence. This has been a challenging year, yet we have remained steadfast in our focus and it is wonderful to be acknowledged for the work that we are doing."

UCT continues to perform well in global rankings and this year leads Africa in four major world university rankings, including Times Higher Education (THE) World University Rankings, Quacquarelli Symonds (QS) World University Rankings and the Center for World University Rankings (CWUR).

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02 Shadreck Chirikure honoured for novel research on Great Zimbabwe

Professor Chirikure won a 2019 Shanghai Archaeology Forum Research Award for his work on Great Zimbabwe, affirming that "the pivot for understanding communities of the past is set from within [Africa], and not from without."

Chirikure, of UCT's Department of Archaeology, was one of only 10 recipients of the award, beating 116 nominations from around the world at the 4th Shanghai Archaeology Forum at Shanghai University.

The forum, inaugurated in 2013, honours high-impact research in global archaeology. Chirikure, who presented his research on Great Zimbabwe's archaeometry and urbanism at the event, confirmed that there has been a call from archaeologists for those who grew up in African societies to offer their perspectives on various aspects of the site, to broaden the interpretive scope of archaeology.

Although Great Zimbabwe is a major international site, it has attracted very little research from native archaeologists and researchers over the past 100 years and "local voices were missing," said Chirikure.

"The intellectual significance of the work is that different meanings emerge when the pivot for understanding communities in the past is set from within, and not from without," he continued. "This might sound like a minor point but given the history of colonialism in Africa, where the external was often privileged over the internal, such a perspective has far reaching implications."

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03 Prof Elmi Muller wins 2019 Alan Pifer Award

Professor Elmi Muller, head of the Division of General Surgery at UCT and head of the Transplant Unit at Groote Schuur Hospital, was recognised for her trailblazing work in the field of organ transplantation in HIV-positive patients.

The Alan Pifer Award, which carries a purse of R20 000, is awarded annually by UCT's vice-chancellor in recognition of outstanding welfare-related research that benefits South Africa's disadvantaged people.

Muller, who completed the world's first kidney transplant between an HIV-positive patient and donor in 2008, is a global authority on kidney and liver transplantation and an innovator in the field of organ transplantation in HIV-positive patients.

As such, she has served on the World Health Organization's Task Force for Transplantation, is the first person from Africa to take on the role of president of The Transplantation Society (TTS), and is a member of the international Declaration of Istanbul Custodian Group from 2010 to 2016, when she was elected chair of the group. Additionally, Muller was recently recognised with an A1 NRF rating.

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04 UCT's role in duo's Nobel win

The founders of J-PAL Africa at UCT were awarded the 2019 Nobel Prize in Economic Sciences for their work fighting poverty around the world.

Professors Abhijit Banerjee and Esther Duflo, co-founders of the Abdul Latif Jameel Poverty Action Lab (J-PAL), the international counterpart to J-PAL Africa at UCT, were recognised for their work to reduce global poverty by ensuring economic policies and practices are informed by scientific evidence.

Said the Nobel statement: "The research conducted by this year's laureates has considerably improved our ability to fight global poverty. In just two decades, their new experiment-based approach has transformed development economics, which is now a flourishing field of research."

J-PAL Africa is housed in the Southern Africa Labour and Development Research Unit (SALDRU) in UCT's School of Economics.

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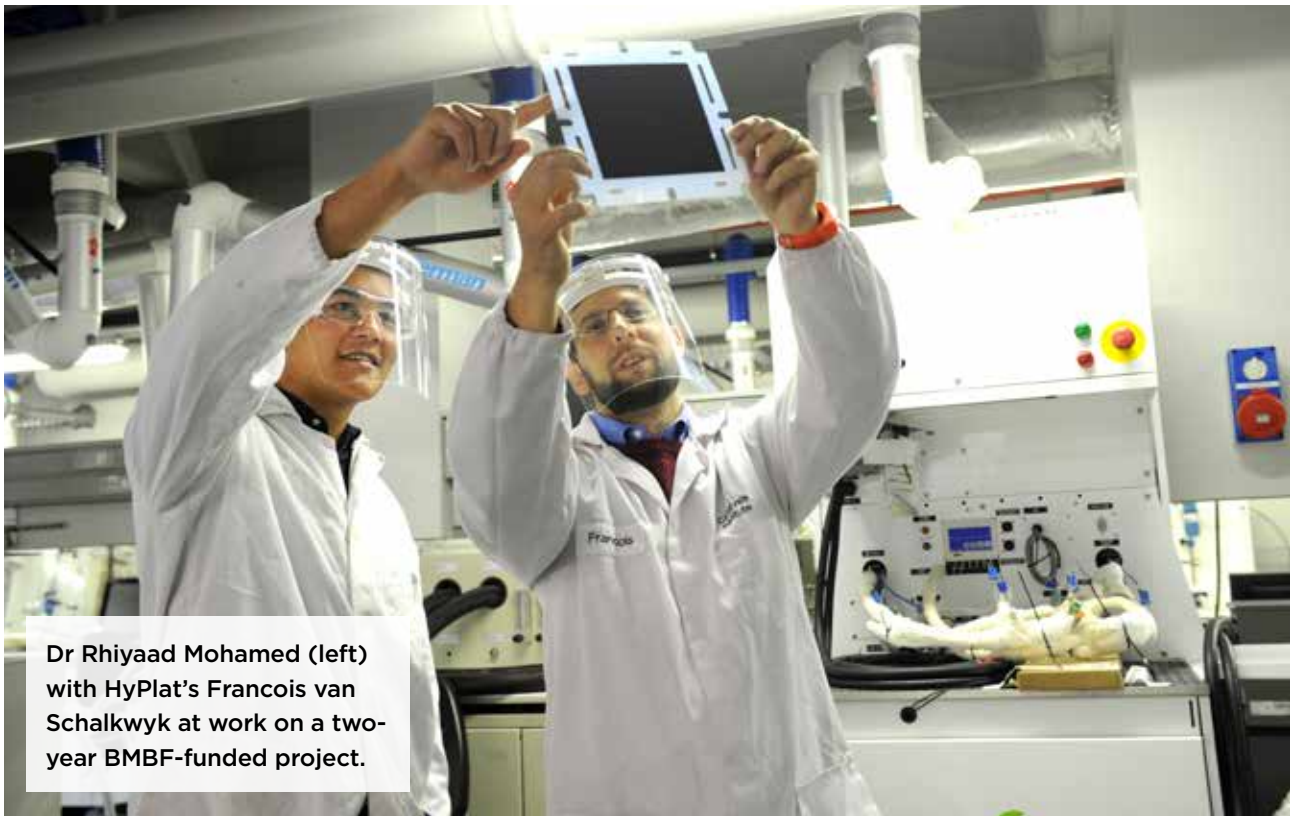
05 German funding boost for UCT electrolyser technology

UCT's Electrolyser Research Group secured close to R3 million in funding to advance its electrolyser catalyst-coated membranes (CCMs) used for hydrogen production.



Dr Rhiyaad Mohamed (left) with HyPlat's Francois van Schalkwyk at work on a two-year BMBF-funded project.

The funding, received from Germany's Federal Ministry of Education and Research (BMBF), will further power the Electrolyser Research Group's project, titled "Reaction kinetic improvements by using novel catalyst layers for proton exchange membrane (PEM) water electrolysis".

The project's goal is to support African partners with contract research for commercialisation through the acceleration of PEM water electrolyser CCM technologies.

"By improving the efficiency of PEM electrolysers, used to produce clean hydrogen, South Africa will be placed at the forefront of this technology development," said Dr Rhiyaad Mohamed, head of the Electrolyser Research Group, part of HySA Catalysis, hosted by UCT's Catalysis Institute in the Department of Chemical Engineering, and Mintek, South Africa's national mineral research organisation.

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06 Prof Chibale an inspirational leader in global pharma

UCT's Professor Kelly Chibale, founder and director of Africa's first integrated drug discovery and development centre, H3D, has been chosen as one of the world's top 60 inspirational leaders in the global pharmaceutical industry.

The United States-based Medicine Maker's prestigious 2020 Power List recognised Chibale as one of the leading professionals "working hard to improve our world ... driving the industry forward and saving lives by developing new medicines" in a particularly challenging year.

Said Chibale of the accolade, "I am greatly encouraged that what we have been doing in Africa in the field of drug discovery is being acknowledged and recognised on the global stage."

His research focused on delivering safe and affordable treatment options for tuberculosis and malaria; H3D is also renowned for its groundbreaking research into a potential single-dose treatment against malaria.

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07 Dr Robert Morrell honoured with Rhodes' Distinguished Alumni Award

Selection committee unanimously recognises Morrell, director of the Next Generation Professoriate (NGP) and New Generation of Academics Programme (nGAP) in the Office of the Vice-Chancellor.

Morrell, a social scientist and leading author and scholar in gender and masculinity studies, received the honour from his alma mater, Rhodes University. He is also B1-rated by the South African National Research Foundation. Described by UCT's Emeritus Professor Alan Rycroft as "one of the most engaged academics that I know, with a rare ability to link sociological, historical and legal writing", Morrell's research straddles the "unusual ground", or third space, between UCT's academic and non-academic sectors.

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08 UCT researchers excel at L'Oréal-UNESCO awards

Four women researchers from UCT were among only seven recognised by the inaugural L'Oréal-UNESCO For Women in Science South African National Programme in recognition of their excellent contributions to science.

Shantelle Claassen (Department of Pathology), Emma Platts (Department of Mathematics and Applied Mathematics) and Chelsea Tucker (Department of Chemical Engineering) were each awarded an R80 000 grant to be put towards the completion of their doctoral studies.

Dr Melissa Nel, a postdoctoral researcher in the Department of Medicine, received a grant of R160 000 to help further her laboratory research.

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From left: H.E. Mr Aurélien Lechevallier, Professor Martiale Zabaze-Kana (UNESCO), Chelsea Tucker (UCT), Emma Platts (UCT), Dr Yogandree Ramsamy (University of KwaZulu-Natal), Dr Busiswa Ndaba (Agricultural Research Council), Dr Melissa Nel (UCT), Sinenhlanhla Sikhosana (University of KwaZulu-Natal), Gilles Antoine (L'Oréal South Africa), Shantelle Claassen (UCT) and Dr Phil Mjwara (South African Department of Science & Innovation).

09 Boost for UCT e-waste recovery project

A UCT project that focuses on the recovery of valuable metals from e-waste through small-scale, local recyclers, is among six recipients of the 2020 German-African Innovation Incentive Award (GAIIA).

Professor Jochen Petersen, of the Department of Chemical Engineering, heads the collaborative project to develop technology for the systematic recovery of valuable metals from electronic waste. As one of six recipients of the GAIIA award, the project has been awarded €150 000 on the basis of its excellent research results with high exploitation potential.

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10 Award-winning plastic pollution research

Takunda Chitaka, a PhD candidate in the Department of Chemical Engineering, received the Blue Charter Fellowship from The Association of Commonwealth Universities for her research into plastic pollution on Cape Town's beaches.

Chitaka was also the first recipient of the Excellence in Academia PETCO Award, an honour established by PETCO, a South African organisation specialising in the recycling of polyethylene terephthalate (PET) plastic.

Using beach surveys to estimate the amount of litter that flows into the marine environment, Chitaka's empirical evidence seeks to understand the source of plastic pollution on beaches, with her PhD thesis submitting that litter should be included in the lifecycle management of plastic products.

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11 UCT researchers selected for UN global climate change report

Dr Christopher Trisos and Professor Harald Winkler appointed to international team to write and review the United Nations' (UN) Synthesis Report.

Trisos and Winkler, both associates of UCT's African Climate and Development Initiative, will work on the Sixth Assessment Report (AR6 SYR) as part of a global team of 30 authors and nine review editors.

The International Panel on Climate Change (IPCC) is the United Nations (UN) body that assesses the science related to climate change, and the AR6 SYR is a document that integrates all the IPCC's reports in the sixth assessment cycle.

Authors are nominated by their governments for the IPCC's Working Groups or Special Reports, and then selected by the IPCC. The AR6 SYR will provide policymakers with the most up-to-date scientific information relevant to climate change and serve as the basis for international negotiations. It will be completed in time for the first global stocktake in 2023 of progress made on achieving the Paris Agreement.

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12 Ready for Gen Z at Africa's first Centre of Law & Technology

New centre looks to bring technology's impact to legal education.

The new multidisciplinary centre, which will be housed in the Faculty of Law, will pilot research and draw further on the interconnectedness of law and technology for teaching and learning, in a bid to keep up with the demands of a modern, tech-driven world.

Ongoing debates within the faculty have focused on how much globalisation and technology will continue to impact the LLB academic programme. Under scrutiny are the ways that Generation Z consumes knowledge and how this will impact the teaching of law, with the new centre aiming to use technological trends to positively impact legal education.

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13 Meet the Researchers without Borders

The inaugural Researchers without Borders programme – a collaboration between UCT and Bristol University in the UK – boasts eight PhD candidates from across sub-Saharan Africa who will work on research projects that harness the strengths and capabilities of both institutions.

The "profound collaboration", as described by Vice-Chancellor Professor Mamokgethi Phakeng, will give the candidates an opportunity to conduct research that is relevant to their home countries while being empowered to travel, network and receive a dual degree. Participants will be registered at and have supervisors and co-supervisors at both universities, spending almost equal amounts of time at each institution during the four-year, fully-funded scholarship programme.

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The PhD candidates selected as the first cohort of the UCT–Bristol University Researchers without Borders programme: (back row, left to right) Kathleen Kehoe, Ryan Aylward, Kennedy Kipkoech; (middle row, left to right) Nina Abrahams, Shani de Beer; (front row, left to right) Tanja Gordon, Lucinda Tsunga and Bongai Munguni.

14 UCT trio honoured with UCT Creative Works Award

Architect Clint Abrahams and associate professor musicians Andrew Lilley and Dizu Plaatjies, share award that recognises artworks, performances, productions, compositions and architectural designs by university staff.

Community & Resilience in Macassar

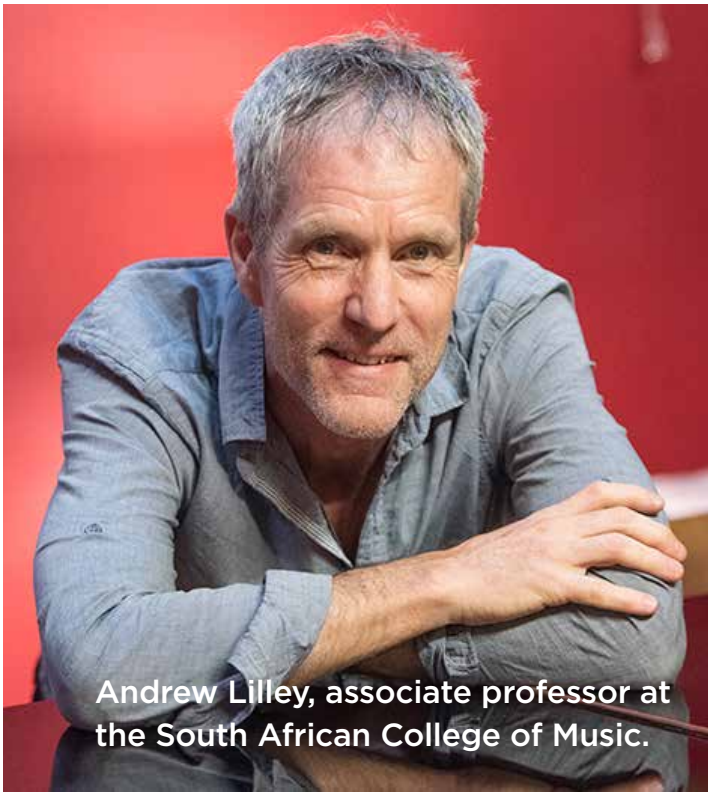
Clint Abrahams, architect and academic in the School of Architecture, Planning & Geomatics in the Faculty of Engineering & the Built Environment, was recognised for his design-build exhibition, *Macassar: "Who we are"*.

In exploring the postcolonial challenges faced by South Africa's displaced communities, Abrahams developed a street photography project involving Macassar youth. The subsequent exhibition was held in the Macassar public library and two private homes, blending photographs with elders' stories to create spaces for intergenerational dialogue and instil new stories of hope and dignity.

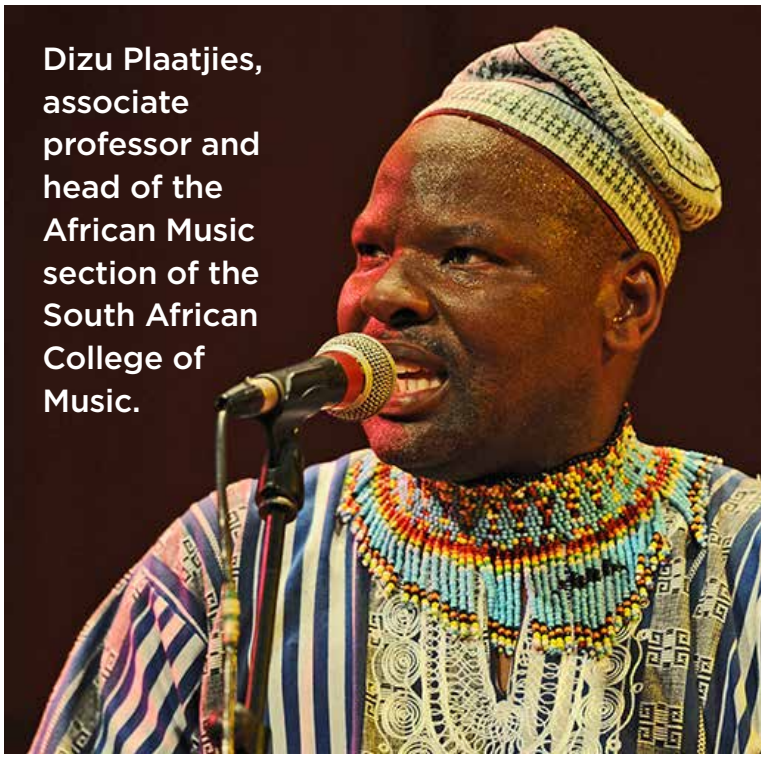
Honouring the brotherhood of Jazz

Based at the South African College of Music (SACM), Associate Professor Andrew Lilley was honoured for his album, *Brother Gone*, a compilation of original compositional works recorded for a jazz septet.

The project is the result of collaborations with the Arts Foundation in Sweden, where jazz musicians have strong roots in the Afro-American jazz tradition, similar to that of South African jazz. Notably, *Brother Gone*'s "Song for Bheki", which was written for South African pianist Bheki Mseleku, a significant contributor to South African jazz, achieved finalist status for original song in the 21st Annual USA Songwriting Competition in 2016.



Andrew Lilley, associate professor at the South African College of Music.



Dizu Plaatjies, associate professor and head of the African Music section of the South African College of Music.

The Common String

Associate Professor Dizu Plaatjies, head of the African Music section of the SACM, was honoured for his multiple award-winning 11-track album, *Ubuntu – The Common String*.

An internationally renowned performer, teacher and "intrepid researcher" of his African heritage, Plaatjies' *Ubuntu* combines a unique blend of vocals, guitar, percussion and horns, resulting in a mixture of styles and influences. The album reached the top 10 of the Transglobal World Music Charts, and was selected as Best African Adult Album (SA Music Awards) and Top of the World Album (*British Songlines Magazine*).

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Professor Salome Maswime, head of Global Surgery.

15 UCT's two WEF Young Scientists

Dr Sarah Fawcett and Professor Salome Maswime have been selected by the World Economic Forum (WEF) to participate in the prestigious Young Scientists programme.

Joining an elite group of researchers under the age of 40, both Fawcett and Maswime have been selected on the basis of their contribution to advancing the frontiers of science in the areas of health, sustainability, inclusiveness and equity.

Fawcett, a senior lecturer in the Department of Oceanography, returned to South Africa after completing her PhD in geoscience at Princeton University. In the four years since her appointment as lecturer at UCT, she has established

a strong and diverse research group, raising funds to build a new marine biogeochemistry lab at UCT that will facilitate high-quality, high-impact research, and train the next generation of African scientists.

As head of Global Surgery, Maswime's research focuses on ensuring that African mothers and their babies survive childbirth. With sub-Saharan Africa accounting for approximately two-thirds of the deaths of women during and following pregnancy and childbirth, Maswime's work researches caesarean sections and stillbirths, and is committed to finding interventions that will reduce maternal mortality rate.

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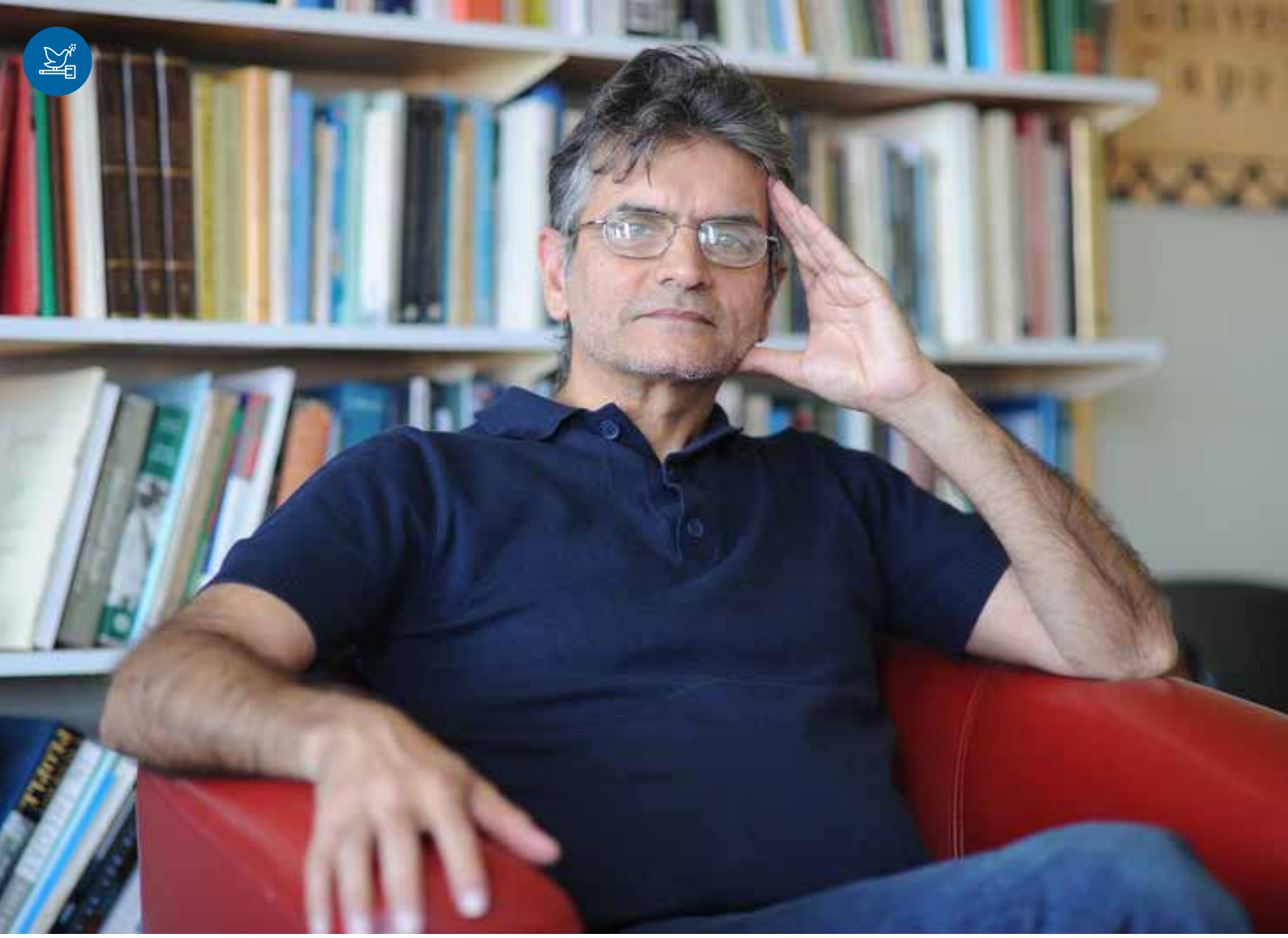
Dr Sarah Fawcett of the Department of Oceanography



16 UCT professor clinches Georg Forster Award

Abdulkader Tayob, professor of Islamic Studies at UCT's Department of Religious Studies, has been awarded the Alexander von Humboldt Foundation's Georg Forster Award.

Tayob, who is also the current DST/NRF SARChI chair in Islam, African Publics and Religious Values at UCT, was nominated for the award by Leibniz-Zentrum Moderner Orient (ZMO). He will work at the ZMO in Berlin for a period of six months, conducting a research project in close collaboration with a colleague.

The opportunity will enable him to "fine tune established themes and explore new directions with colleagues ... An award might be assigned to an individual, but it reflects shared projects, questions and concerns."

Tayob's research has set standards for the contemporary study of Islam in South Africa and more widely in Africa.

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17 Dual ICA honours for UCT's Herman Wasserman

The professor received honours from the International Communication Association (ICA), the world's largest academic association for those engaged in the broad discipline of communication.

Wasserman, who is director of the Centre for Film and Media Studies (CFMS), is the first person working at an African university to have been honoured by the ICA, first in his election as an ICA Fellow, and second in his appointment as editor of *Annals of the International Communication Association* journal.

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18 UCT's GSB wins top international business school competition

A team of MBA students from the UCT Graduate School of Business (GSB), led by senior lecturer and MBA alumnus, Johannes Schueler, won the 39th annual John Molson MBA International Case Competition – the oldest and largest MBA company analysis competition in the world.

As the only business school from Africa to make the cut, the team prevailed against hundreds of MBA students representing business schools from more than a dozen countries for the prize of CA$10 000.

Though the key purpose of the competition is to bridge the gap between the academic and real business worlds, Schueler explained that it also opens avenues to collaborative projects and an exchange of knowledge and expertise.

Key criteria included creativity, insight, substance and plausibility of implementation of the solutions and plans submitted. A round-robin format allowed teams to analyse

seven unpublished case studies that focused on how culture, globalisation, environmental issues, technology, the economy and customer experience will impact business in the coming years.

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19

GSB teaching case study wins top international award

Stephanie Barden and Professor Geoff Bick of UCT's Graduate School of Business (GSB) win top honours in the CEEMAN & Emerald Case Writing Competition.

The researchers beat more than 60 entrants from 15 countries, making this the second consecutive year that the GSB has won the competition. Barden and Bick's case "Biotronik: Bypassing the commodity trap of medical devices in South African healthcare" assessed the challenges facing Biotronik SA, an importer and distributor of cardiac devices, including remaining competitive and profitable without compromising quality in the South African cardiac device industry.

Said Bick, "It is a great honour to receive this award, particularly as the competition is becoming more intense. Despite the pandemic, teaching cases continue to play an important role in the business school learning experience – even in virtual classrooms."

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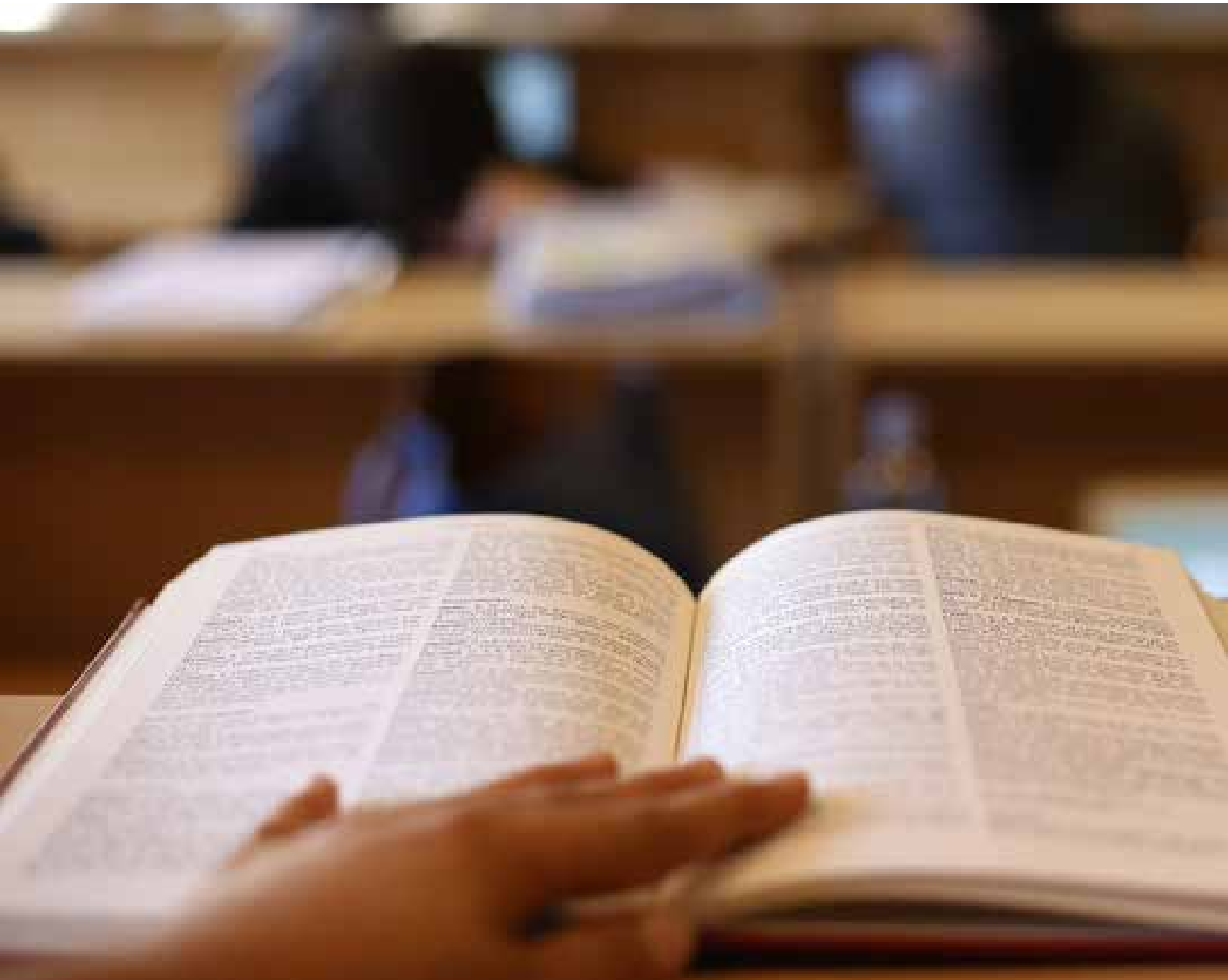
20 Art, engineering works win UCT Book Award

The 2019 UCT Book Award, which recognises outstanding publications by staff, was awarded to Anna Tietze and Professor Alphose Zingoni for their works in art and engineering, respectively.

Tietze, a senior lecturer based at the Michaelis School of Fine Art in the Faculty of Humanities, released her publication, *"A History of the Iziko South African National Gallery: Reflections on Art and National Identity"*, at a time of significant reflection within South African museums and universities on how these institutions could be rethought in the future. Her book is a study of impeccable archival research and the



handling of contentious issues, aiming to uncover the often-unspoken policies and politics of a public art institution.

Zingoni was honoured for his book, *"Shell Structures in Civil and Mechanical Engineering: Theory and Analysis"* which explores the increasing complexity of applications of shell structures. It thoroughly provides practical and accurate methods and solutions that can be used as benchmarks by developers of engineering software and engineering structures.

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21 UCT engineer awarded 'science Oscar' for capacity development

Associate professor Abimbola Windapo recognised with prestigious 2020 National Science and Technology Forum (NSTF)–South32 award.

Windapo, of the Department of Construction Economics and Management, received her award for her exceptional dedication to training, nurturing and mentoring students in the construction discipline.

Her work, which for the past decade has been used as a basis for framing topics for honours, master's and doctoral research, began in response to the high failure rates of many South African construction companies, as well as the industry's poor health and safety record and its need to adopt sustainable construction techniques in line with the United Nations' Sustainable Development Goals.

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22 Gold medal for leading cervical cancer researcher

Professor Lynette Denny's 25-year body of research on cervical cancer has won the prestigious South African Medical Research Council (SAMRC) Gold Medal.

The honour recognises Denny, a senior specialist in gynaecological oncology in UCT's Department of Obstetrics and Gynaecology and Groote Schuur Hospital, as an outstanding South African scientist. Denny is one of Africa's foremost scholars in researching methods of cancer prevention among women living in poverty.

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23 International Society for Vaccines (ISV) best paper award for UCT team

Plaudit follows recognition by ISV of a paper co-authored by the same researchers in the previous year.

The winning paper, "Final Analysis of a Trial of M72/AS01E Vaccine to Prevent Tuberculosis", was co-authored by Professors Mark Hatherill, Robert Wilkinson and Tom Scriba, and Drs Michèle Tameris and Friedrich Thienemann, all of the Faculty of Health Sciences.

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24 Four of UCT's best new 2020 FLAIR fellows

Early-career African researchers receive up to £300 000 to conduct projects that focus on solving needs of the continent.


Dr Rondrotiana Barimalala


Dr Lauren Arendse


Dr Ross Blamey

Dr Lauren Arendse (Drug Discovery and Development Centre, or H3D), Dr Rondrotiana Barimalala, Dr Ross Blamey (Department of Oceanography), and Dr Felix Sizwe Dube (Department of Molecular & Cell Biology), were selected to form part of the 2020 cohort of Future Leaders – African Independent Research (FLAIR) Fellows.

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Dr Felix Sizwe Dube

RESEARCH NEWS & FEATURES

In this section

25 South Africa a leader in global HIV research

The Elsevier Report highlights South Africa as a global leader in HIV/AIDS research, with UCT named 8th top research-producer in the world.

South Africa follows the United States and United Kingdom as the third biggest producer of relevant research in the field, according to the report, which offers a comprehensive overview of the HIV/AIDS research landscape, analysing research published between 2014 and 2018.

"This is an extraordinary achievement, given we're a small country," said Professor Linda-Gail Bekker, deputy director of the Desmond Tutu HIV Centre (DTHC) at UCT's Institute of Infectious Disease and Molecular Medicine (IDM).

While institutions with the highest

HIV/AIDS research output are predominantly located in the US, UCT was named among the top 10, taking the 8th position.

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26 Breaking barriers to a cure for HIV

UCT researchers, in a collaborative study, found an opportunity for intervention in the relapse of the HIV virus by reducing the HIV reservoir.

Professor Carolyn Williamson, head of the Division of Medical Virology at UCT, led the study with the University of North Carolina at Chapel Hill (UNC) and the Centre for the AIDS Program of Research in South Africa (CAPRISA).

In an exceptional finding, the team found that reducing the HIV reservoir, which is a major barrier to developing a cure for HIV, might help enable people to stop treatment without the virus rebounding.

The HIV reservoir consists of viral DNA that survives hidden in the body even after indefinite treatment with antiretrovirals. Antiretroviral treatment can suppress HIV, but it cannot cure the infection. The breakthrough provides an opportunity to further study a biological intervention to reduce the number of infected cells transitioning to latency at the time of initiating treatment, which could restrict the establishment of most of this viral reservoir.

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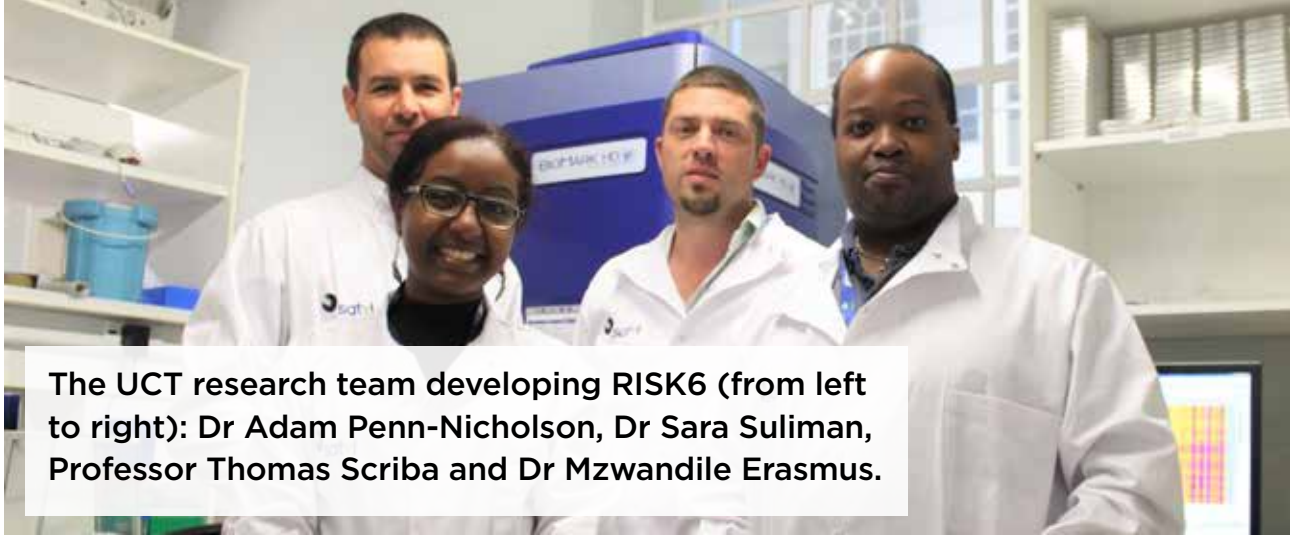

The UCT research team developing RISK6 (from left to right): Dr Adam Penn-Nicholson, Dr Sara Suliman, Professor Thomas Scriba and Dr Mzwandile Erasmus.

27 New, easy finger-prick blood test for TB

Global collaborative group, including UCT researchers, develop new blood-based test that can identify healthy individuals at high risk of developing tuberculosis (TB).

The new diagnostic test, called RISK6, is based on a simple finger-prick blood test to identify TB and people at high risk of developing the disease in the future.

Developed and validated by researchers from the South African Tuberculosis Vaccine Initiative (SATVI) at UCT, the Center for Global Infectious Disease Research – Seattle in the United States, and a large consortium of collaborators, RISK6 can also contribute to understanding how well a patient would respond to treatment and has been validated in seven cohorts across two continents.

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28 First real hope for TB vaccine in a century

Multi-site medical trial involving UCT produces first signal of a potentially effective vaccine against tuberculosis (TB) in almost 100 years.

The final results of the three-year study demonstrated that a vaccine 'can provide long-term protection against lung TB'. It showed a 50% efficacy of the candidate vaccine M72/AS01E in reducing the incidence of lung TB disease in adults already infected with latent TB at the time of vaccination.

These are "game-changing results," said Mark Hatherill, professor and director of the South African Tuberculosis Vaccine Initiative (SATVI). "If we can offer latently infected adults durable protection against pulmonary TB disease, we may be able to interrupt the cycle of TB transmission."

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29 Digital solutions for maternal and child health challenges

Cross-collaborative research explores the role that digital media can play in helping to address key maternal and child health challenges in marginalised communities.

As one of the key stakeholders in Co-designing Community-based ICTs Interventions for Maternal and Child Health (CoMaCH), UCT is actively engaging with marginalised community members on developing solutions for maternal and child health challenges.

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30 Nigerian teenagers need digital mentors

Chikezie Uzuegbunam's three-year study investigates how rural and urban teenagers in Nigeria access, understand, work and play with digital technologies.

Uzuegbunam, a postdoctoral researcher, found that despite the presence and potential impact of technology in their lives, childrens' digital practices are hampered by a lack of support at home and school.

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31 Children, pests and poison: a toxic layering

Multi-disciplinary group of researchers completes 10-year study on illegal street pesticides causing accidental death among children.

The research highlights the tragic nexus of pests, poisons and parents protecting their children and homes in informal settlements.

Street pesticides – either legal agricultural products repurposed and sold illegally in urban townships, or packaged in other countries and not registered for legal use in South Africa – are bought by residents "to try and protect their homes and children from pests such as rats and cockroaches", said Professor Andrea Rother, head of the Environmental Health Division.

"Unfortunately, these highly toxic substances – often banned in high-income countries or not registered for household use – are also being accidentally consumed by children."

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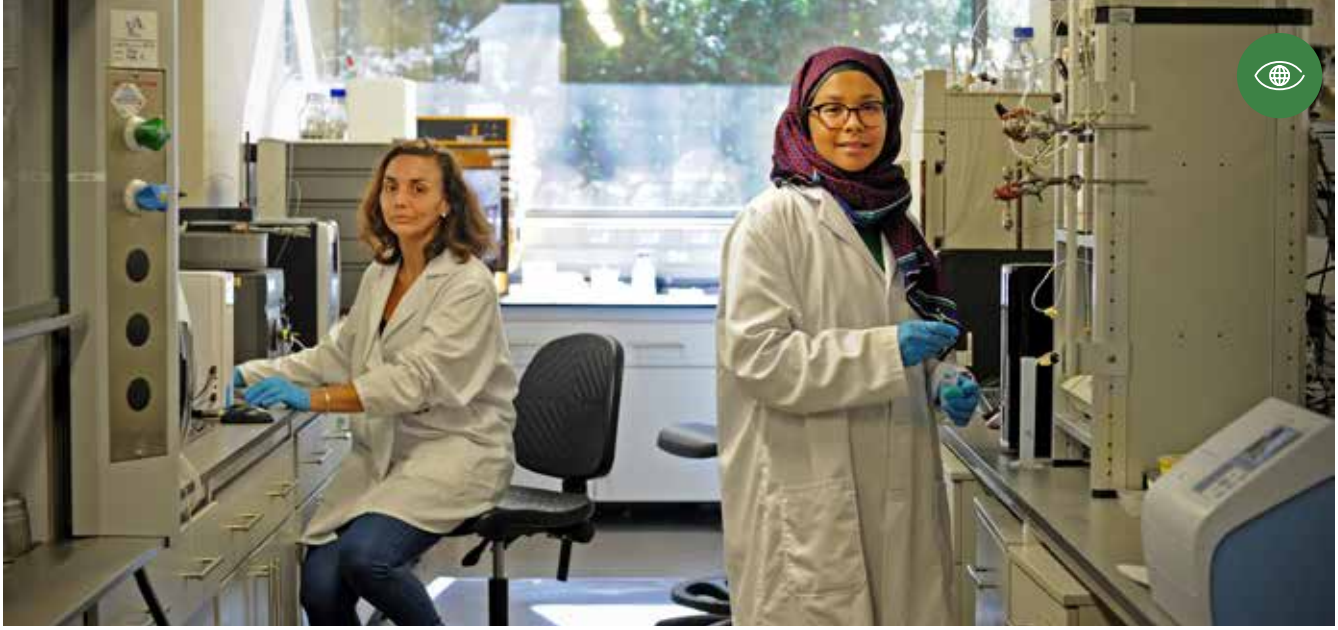

32 SA women take the lead in structural biology

UCT's Anna Ebrecht and Naadia van der Bergh were part of a collaborative study that achieved a remarkable feat in the field of structural biology.

The team, made up largely of women scientists, has determined the structure of an enzyme known as cytochrome P450 reductase (CPR) that could be a key component in producing valuable commodity chemicals in greener, more sustainable processes.

"The task was enormous," said van der Bergh. "CPR is a massive enzyme. It contains 679 amino acids and there were two molecules in the asymmetric unit. Added to that, our initial structure was determined and solved on the basis of a low-resolution map. Interpreting this structure was a truly gruelling effort."

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33 Landmark finding for sickle cell anaemia

Genetic modifiers of long-term survivors with sickle cell anaemia (SCA) reveals possible novel therapeutic interventions.

Illuminating possible new treatment pathways, a study reveals that long-term survivor patients present certain genetic modifiers that may hold the key to explore new routes of treatment, presenting too the opportunity for a paradigm shift in science policy and diplomacy, says principal investigator and director of Genetic Medicine of African Populations (GeneMAP), Professor Ambroise Wonkam.

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34 Global South research on humpback whales and climate change

Use of ocean models with whale observation networks can help us to understand how a changing climate is affecting humpback whales.

Scientists from seven research institutions, including UCT's Professor Marcello Vichi and Dr Subhra Prakash Dey, are collaborating on the Whales and Climate Program, a six-year project to better understand the effects of climate change on humpback whale populations and migration patterns.

The programme will include 25 researchers from five countries and a number of Antarctic voyages. Using data collected in different areas of the southern hemisphere, research teams from Brazil, Chile, Ecuador,

Panama and South Africa will help to provide further clues as to the multi-faceted ways that humpback whales interact with their ecosystems.

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35 UCT embarks on global Mission Atlantic project

Dr Lynne Shannon joins global ocean experts to map environmental risks that affect Atlantic Ocean ecosystems.

Shannon, of the Department of Biological Sciences, has joined experts from Europe, the United Kingdom, South America and North America for the €11.5 million initiative that will assess the current and imminent environmental risks posed by climate change, natural disasters and human activities.

The project, called Mission Atlantic, will also explore sustainable development of the Atlantic Ocean and is the first initiative of its kind to develop and systematically apply Integrated Ecosystem Assessments (IEAs) at the Atlantic basin scale.

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36 Study lets cat out of the bag

Research associate Dr Robert Simmons' paper highlights the high cost of feline predation for Cape Town's fauna.

The paper, "Caught on camera: The impacts of urban domestic cats on wild prey in an African city and neighbouring protected areas", studied domestic cats in three Cape Town suburbs, providing valuable insights on their impact on wildlife.

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37 Exploited leopards pay long-term inbreeding costs

UCT study is among the first to demonstrate long-term genetic costs of exploitation-driven behavioural changes in leopards.

The study, conducted by UCT's Vincent Naude, Guy Balme and Jacqueline Bishop, explores the impact of threats such as the killing of male leopards, poaching, trophy hunting and the illegal trade of leopard body parts for traditional medicine and cultural attire.

The subsequent overall decline in leopard numbers contributes to an increase in inbreeding, with severe consequences for the species, including physical defects, severe reproductive costs and even sterility.

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38 Gang life: how to leave and stay out

Dr Jane Kelly's PhD thesis tackles much-needed research into Cape Town's gangsterism.

Kelly, a Department of Psychology PhD graduate, conducted two rounds of life-history interviews with 12 former gang members, ranging in age from their early 20s to their 60s. All interviewees live in live in a community known for high rates of gang violence and with several high-ranking gangs competing in the area.

Yet Kelly's research indicated that key turning points, such as incarceration and religious experiences, had transformed the participants into pro-social men with a desire to care for their families and serve as role models in the community.

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39 Corporations contributing to solving grand challenges

Study investigates the motivations of corporations who invest in potential solutions to social and ecological challenges in South Africa.

Five communities, four corporations and three auxiliary company case studies set the stage for the research into why some corporations invest in resilience-building efforts to curb grand challenges.

The efforts – strategic because they involved significant investment – were found to be motivated for based on which corporate resources were at risk due to social-ecological changes in the communities.

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40 SA's magistracy under the spotlight

High volumes of work, rising stress levels and fear for their safety are some of the concerns highlighted in a survey of South African magistrates.

UCT's Democratic Governance & Rights Unit (DGRU) facilitated the research survey on South African magistrates' workloads and support structures, as well as the reasons for their high levels of stress and anxiety.

Alarming findings include magistrates fearing for their safety in and outside of court, and the negative impact of stress on their work. "Right now, there are no programmes that speak to the psychosocial care of magistrates who often deal with extremely traumatic cases daily," said Vanja Karth, director of the DGRU.

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41 Safeguarding of the judiciary

The 'Lilongwe Principles and Guidelines on the Selection and Appointment of Judicial Officers' sets out best practice for judicial selection in Southern Africa.

A new set of guidelines and principles – published by the Democratic Governance and Rights Unit (DGRU) at UCT and the Southern African Chief Justices Forum (SACJF) – are helping to improve the process of judicial officer selection in Southern Africa.

The *'Lilongwe Principles and Guidelines on the Selection and Appointment of Judicial Officers'* were created to safeguard the independence and integrity of the judiciary. It is the first document of its kind that deals with best practices for judicial selection.

"It is truly a case of African solutions for African problems... based on regional experiences, research and practice," says Chris Oxtoby, senior researcher for the DGRU.

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42 Biochemistry breakthrough a global first

Three UCT researchers have visualised – at a resolution close to that of individual atoms – the intact active site of a commercially important biological molecule.

Dr Jeremy Woodward, Dr Andani Mulelu and Angela Kirykowicz gained novel insights into the structure of a group of enzymes known as nitrilases, which have enormous biotechnological potential.

"We're not just following nature," said Mulelu, who is currently a research scientist at the H3D Drug Discovery and Development Centre. "We are being inspired by it and altering what it can do. We are able to produce brand new enzymes."

The team investigated the structure of the enzymes using cryo-electron microscopy (cryo-EM), a technique that can determine the structure of large biological molecules. It helped them to produce the first high-resolution visualisation of a cryo-EM protein structure in Africa.

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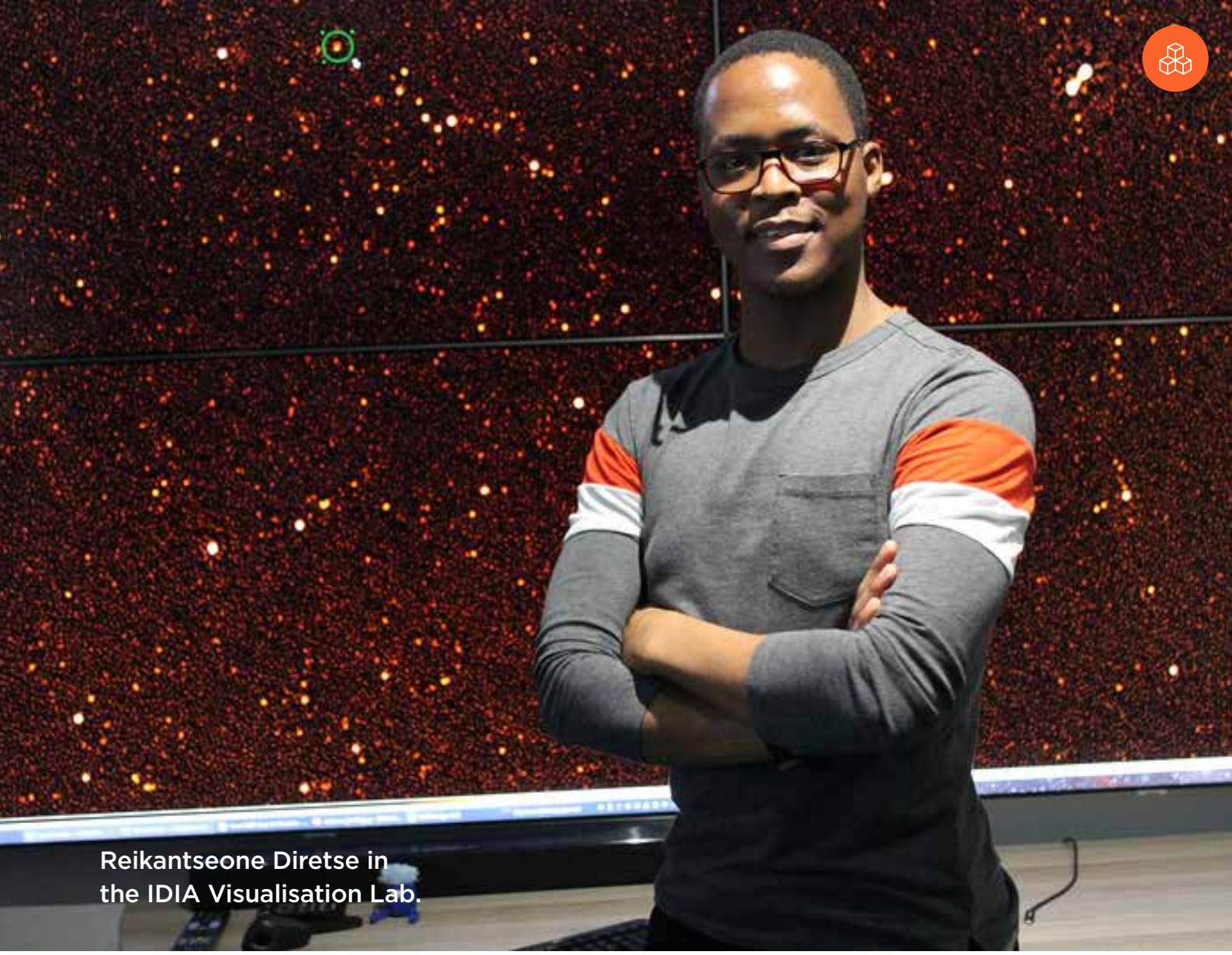
Dr Andani Mulelu and Dr Jeremy Woodward at the Electron Bioimaging Centre in the United Kingdom.



Reikantseone Diretse in the IDIA Visualisation Lab.

43 The highest energy light from a gamma-ray

UCT astronomers part of an international team that has gained further insight into the physical processes at work during gamma-ray bursts.

Professor Patrick Woudt and MSc student Reikantseone Diretse were among more than 300 researchers that observed a gamma-ray burst (GRB) with an afterglow featuring the highest energy photons ever detected in these events: photons a trillion times more energetic than visible light.

Woudt and Diretse were part of the team responsible for tracking the emission of radio waves in the afterglow of GRB 190114C, using the new MeerKAT radio telescope in South Africa to record the emission.

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44 UCT to lead network on tackling mine dust

UCT-based network hopes to tackle the long-term health and environmental problems caused by toxic mine dust.

With funding awarded by the United Kingdom's Global Challenges Research Fund (GCRF), the new, pioneering GCRF Mine Dust and Health Network will gather a collaborative think-tank to develop integrated and inclusive solutions for communities that are vulnerable to mine dust.

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45 In pursuit of a positive mining legacy

Interdisciplinary UCT research alliance awarded NRF funding for second phase of a project focused on remediating degraded mining land.

The project aims to determine whether fibre-rich biomass such as bamboo can be used to remediate degraded mining land in a way that is economically feasible and can generate sustainable and inclusive economic growth.

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46 Human hand behind SA's land-degrading dust storms

Associate Professor Frank Eckardt's research pinpoints a direct human cause for Southern Africa's dust emissions.

Though farmers try to keep some stubble or cover crops on the denuded farmlands that cause windborne dust, efforts are patchy. And livestock trampling and grazing in a degraded field can cause more damage.

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47 Diseased livestock: infrared system's early warning

An inexpensive, early-warning diagnostic tool, developed by Professor Amit Mishra and 3DIMO, holds hope for small- and medium-scale livestock farmers, many of whom are black women.

The basic infrared camera measures the heat signature of livestock, providing useful information such as a higher temperature on a foreleg that may signal inflammation. The Thola infrared imaging tool, being developed by local, black economic empowerment start-up company 3DIMO, is in the final stages of phase one of a pilot project involving several emerging farmers in the Free State.

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48 Climate change and southern Africa's emerging food crisis

UCT researchers are exploring whether the looming drought and food crisis in Mozambique, Zimbabwe and southern Zambia could be ascribed – at least in part – to climate change.

The early rains have failed this year amidst a multi-year drought in Mozambique, Zimbabwe and Zambia, leaving the countries at risk of a major food crisis. While the region has a track record of similar weather conditions over the past 140 years, according to recent research led by Dr Piotr Wolski of the Climate System Analysis Group (CSAG) at UCT's Department of Environmental and Geographical Science, the cause for this drought could be climate change.

Wolski is one of only a few researchers in South Africa with the skillset to discern the influence of climate change on extreme weather events – a field also known as attribution of extreme events – to anthropogenic climate change. For the current research, he led a team of specialists in climatology and the region's agriculture from UCT, Stanford University and New Zealand's National Institute for Water and Atmospheric Research.

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49 Research projects boost aquaculture in Africa

UCT embarks on two large collaborative research projects in the development of sustainable aquaculture in Africa.

With 33% of global marine fish stocks overfished and 59% fished at maximum sustainable levels, aquaculture may offer an alternative to wild-caught fish.

In recognising its potential to provide food security, create job opportunities and boost local business prospects, researchers from across Africa have formed the Research Network for Sustainable Marine Aquaculture in Africa (AfriMAQUA).

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50 Humble sandprawn: a champion water filterer

Common sandprawn cast into international spotlight by three UCT researchers.

The researchers, Dr Deena Pillay, Olivia Venter and Kervin Prayag of the Department of Biological Sciences, have discovered the sandprawn's ability to filter coastal water, thus combatting eutrophication – one of the major water quality challenges in the natural world.

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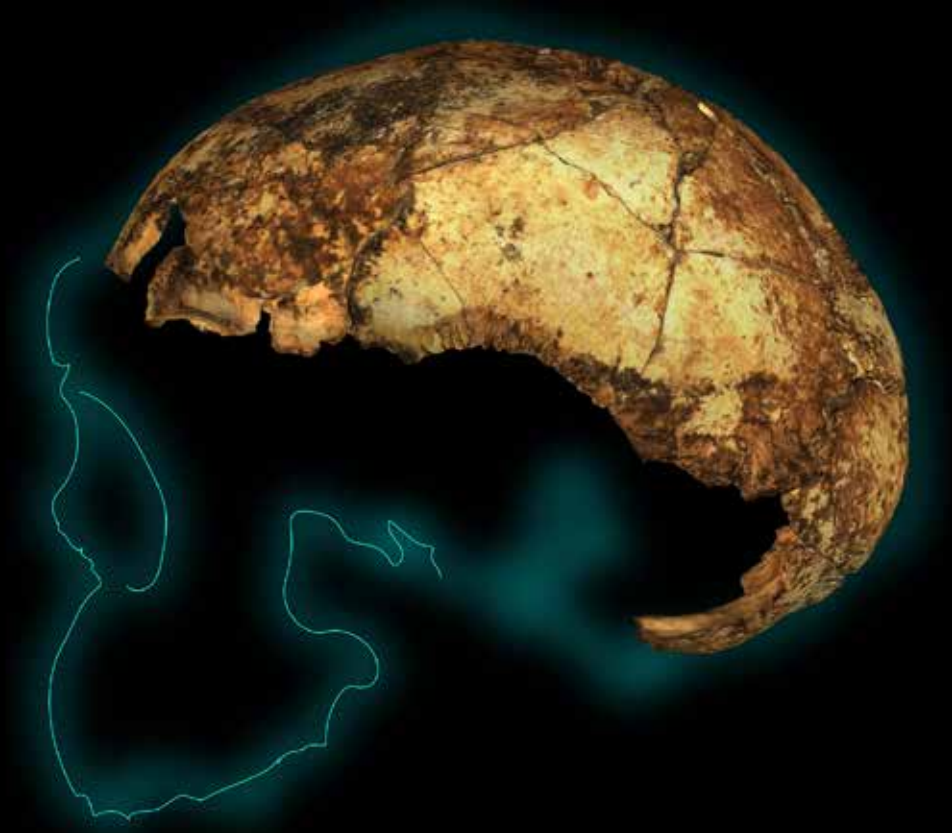

51 Fossil discoveries rewrite human history

Reconstruction of the earliest *Homo erectus* skull changes the face of research into human evolution.

An international team of researchers, including geologists from UCT, has reconstructed – from more than 150 fragments – the earliest known skull of *Homo erectus*, the first of our ancestors to be nearly human-like in their anatomy and aspects of their behaviour. The two-million-year-old fossil was excavated in the Cradle of Humankind in South Africa over five years.

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52 When giant mustelids roamed South Africa

Recent discoveries by UCT and Iziko Museums of South Africa scientists show how a wolf-sized otter and leopard-sized wolverine lived along South Africa's West Coast 5 million years ago.

In their research, Dr Alberto Valenciano and Dr Romala Govender describe the teeth, forelimb and hindlimb skeletons of these mustelids, a family of carnivorous mammals.

The fossils represent the first new specimens of the family described from the Langebaanweg palaeontological site, on South Africa's south-west coast, in more than 40 years.

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TOP COVID RESEARCH STORIES

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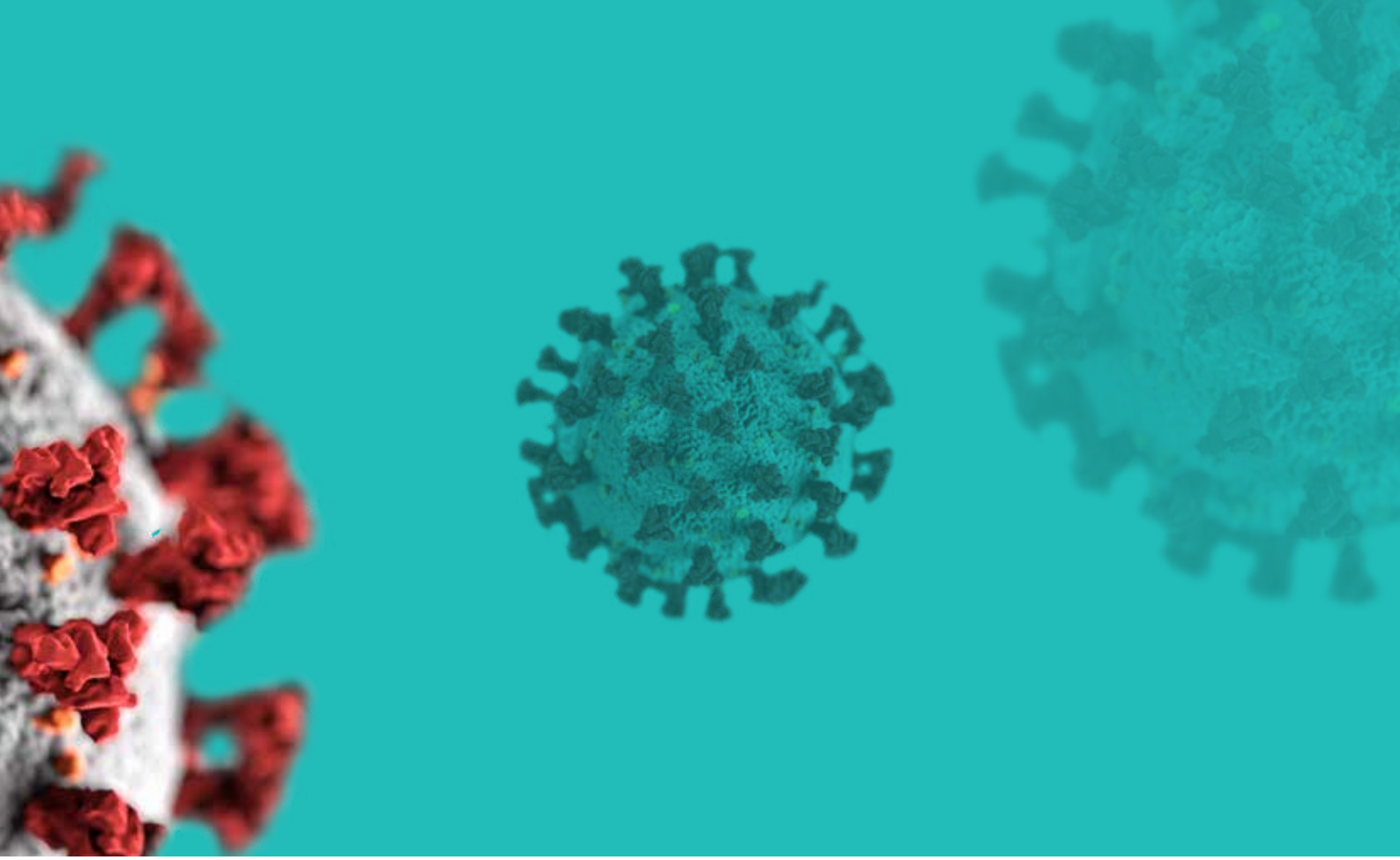

COVID-19 and beyond:
Building on UCT's potential for engaged scholarship, collaboration and interdisciplinarity

COVID-19 has left no corner of society unscathed – but it is also serving as a catalyst for innovation and collaboration. Initially seen as the domain of politicians and health scientists, it very soon became obvious that the world is dealing with a humanitarian and economic crisis in which every discipline and sector of society has a role to play.

Social responsiveness is UCT's third pillar of academic performance criteria, alongside teaching and learning, and research. And COVID-19 has provided a crucible moment for the University to scale up its service role and leverage an interdisciplinary and transdisciplinary approach. Plans and priorities for 2020 were regeared, staff seconded, funding redirected, laboratories repurposed, partnerships formed, and online platforms launched. From algorithms to assays, school closures to convalescent serums, fake news to social fracture, vaccines to visors, social distancing to supply chains, cartooning to community-action networks, adolescents to authoritarianism, UCT has contributed significantly through rigorous thought leadership and engaged scholarship across the spectrum.

Wanting to harness and learn from this multifaceted response, we convened three virtual conversations with UCT academics and researchers who have been working at the coalface of COVID-19. The aim was to explore the experience of and potential for engaged scholarship, collaboration and interdisciplinarity within the University.

Held in August and September 2020, each conversation explored a different theme:

1. How can we respond, coordinate and communicate better?
2. Do we know enough about the virus?
3. How do we live with and beyond the pandemic?

There is a huge variety of COVID-19-related work underway at the University, but common to all conversations was the call to collaboration and cooperation, the challenge to make it easier, and a celebration of the softening and reorganisation of hierarchies and the reaching beyond silos. The pandemic is highlighting the complexity and interdependence of the world we live in and it has laid bare the fact that we cannot hope to address an all-encompassing crisis of this nature unless we do so holistically. This means the sciences and the social and behavioural sciences must work hand in hand.

The last few months have shown us that there is a huge need for academics across the spectrum to work with governments and other partners to develop solutions to the country's most pressing civic, social, and economic problems, especially in relation to vulnerable groups. However, such collaboration is not always easy. Our conversations highlighted a need to re-design systems and hierarchies within the University as well as a revision of national compliance requirements and the unnecessary red tape obstructing critical research processes and international collaborations.

There was also a suggestion that the University use its brand and convening power to open doors and unlock greater levels of collaboration at national and provincial levels of government, building strong relationships as a foundation for future engagement. It is clear that where strong relationships were already in place, we have been able to move rapidly and respond with agency when the crisis hit.

The pandemic has also underscored how important it is to involve the voices of those closest to the impact. The rigorous action from communities mobilising to respond to the crisis has been one of the major positives of the last few months.

The stories featured in the following three-part section reflect these challenges and demonstrate effective approaches and their impact. They were written during the course of the past few months, some near the outbreak of the pandemic, others more recently. As a collection they give a layered overview of the University's response to the pandemic over time, and an illustration of the potential for a more effective response to this and future challenges.

The COVID-19 crisis has had the electrifying effect of creating a shared sense of purpose leading to a greater urgency around finding new ways to address the world's challenges. If we can harness the spirit and energy that is evident from the stories we showcase here, and channel our creative, intellectual, organisational and administrative talents, we have a real chance, not only of beating the coronavirus, but of creating a more just and equitable post-COVID-19 world.

Professor SUE HARRISON
Deputy Vice-Chancellor: Research and Internationalisation

THEME 1:
how can we respond, coordinate and communicate better?
Novel responses to a novel virus

53 Collaboration: now is the time

The past two decades have been characterised by efforts to reduce the global burden of disease and parallel efforts to strengthen science, skills and infrastructure in Africa. COVID-19 presents a unique opportunity to build on these successes to advance Africa-centric innovation across disciplines. An effective response, however, demands strong collaboration, fast-tracking of research, and the roll-out of new technologies.

UCT scientists, Salome Maswime, Head of Global Surgery, Collet Dandara, Professor in the Division of Human Genetics in the Department of Pathology, and Sudesh Sivarasu, Associate Professor in Biomedical Engineering, wrote in a recent article published in **The Conversation** that the continent urgently needs a united approach by clinicians, scientists (both in the life and human sciences), biomedical engineers and public health specialists to adequately address the pandemic's reach. Key areas for collaboration include enabling access to huge amounts of data from infected patients that could be used to advance science and medicine and prepare for future pandemics on the continent, and technological advancement. The spread of the pandemic has resulted in an urgent need for new technologies and medical supplies ranging from personal protective equipment to ventilator

components. Where these can't be procured due to worldwide shortages and supply chain issues, African countries need to create their own.

Researchers at UCT have risen to this challenge. For example, Sivarasu and his team of biomedical engineers at UCT have been working on a variety of biomedical devices appropriate to the African context. One of their innovations is ViZAR, a face shield that can be handmade with household items. Approved by the South African Health Products Regulatory Authority (SAHPRA), the team has now scaled production. A few thousand ViZARs are produced each day, simultaneously meeting a shortfall of PPE and facilitating job creation.

A crisis like COVID-19 demands that professional barriers be broken, they argue. But it needs a complete mindset change to achieve this. Delicate choices must be made and the opportunity to tackle the pandemic through science and innovation should not be missed.

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54 Electrical engineering student sees the light

Maintain social distance and wash your hands, two fail-safe methods for tackling the coronavirus. And now UCT electrical engineering student Rowan Naidoo has added a third: switch the lights on.

Naidoo has designed a short wave ultraviolet-C (UVC) light system that disinfects rooms and surfaces in seconds. Naidoo took up his professor's challenge to design a device to counter COVID-19 by using what is already known about UVC's potency in killing viruses and micro-organisms and overcoming the limitations of its current application so that people can return to public spaces in safety. The result: a simple and affordable, smart sanitising system that uses a combination of lamps and occupancy detection sensors. Once a room is determined to be vacant, the system automatically switches on the UVC lights to irradiate the air and surfaces before automatically switching off again. Naidoo's device can also disinfect face masks, transforming single use masks into 100% reusable masks.

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55 ‘Saving even one life is massive’

Work that took place in a small lab on top of UCT’s Anatomy Building is set to impact tens of thousands of people in South Africa at a time when it is needed most. The Medical Devices Lab has played an integral role in developing the Council for Scientific and Industrial Research (CSIR)-designed ventilator that has now been approved for local manufacture and nationwide rollout.

Named CSIR LIFE (Lung Inspiratory Flow Enabler), the ventilator uses standard, hospital-grade oxygen supply to provide a mild level of oxygenated air pressure that helps keep patients’ airways open. The Medical Devices Lab worked as part of a multi-faculty collaboration across the University to carry out usability trails on the ventilator in order to make sure it was as intuitive and safe as possible to use. The Lab is the only provider of this service in South Africa.

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56 Novel device helps relieve pressure on ICU beds

By August, roughly 45% of patients at Groote Schuur Hospital who would otherwise have required mechanical ventilation due to severe COVID-19 had been successfully treated by a novel UCT-designed device known as the high-flow nasal cannula (HFNC). This effective, low-resource alternative to ventilation is one of UCT's many agile responses to the rapidly evolving COVID-19 pandemic.

The treatment, which provides patients with reliable levels of oxygen, is easily implementable and does not require intensive nursing, thus freeing up resources and alleviating pressure on overburdened intensive care units (ICU). UCT's Associate Professor Greg Calligaro, research coordinator at the Centre for Lung Infection and Immunity at the UCT Lung Institute, said the use of HFNC has been a huge team effort. "Many healthcare workers have fast become experts in managing large numbers of patients in profound respiratory failure in an unconventional setting."

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(From left) Owen Ntsasa, director of the Khayelitsha Metropolitan Police with an elder from the community, Kai Goodall and Dr David Oyedokun.

57 Smart tool stops COVID-19 surface transmissions

Khayelitsha was the first community in the Western Cape to receive a batch of a newly-developed multitools developed by a team of electrical engineers from UCT that keeps people from having contact with surfaces that might transmit the virus.

The tool that opens doors and taps is 3D-printed with PLA filament (a thermoplastic polyester) and is 100% biodegradable. Dr David Oyedokun and MSc candidate Kai Goodall headed the project that has seen 2 500 units produced and distributed across South Africa, thanks to funding from the Institute of Electrical and Electronics Engineers Humanitarian Activities Committee (IEEE HAC) and the Special Interest Group on Humanitarian Technology. Other features and design aspects include a protective cover to reduce accidental contact or contamination. "There are a handful of IEEE COVID-19 projects around the world, and we are very proud that UCT is counted as one of the successful project hosts," said Dr Oyedokun.

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58 An ideal policy triangle

When lockdown measures to prevent the spread of COVID-19 were imposed, among the most vulnerable to the economic impact of this were informal workers; unregistered, untaxed and undocumented individuals who are easily overlooked.

UCT researchers in the Southern Africa Labour and Development Research Unit (SALDRU) swung into action to find solutions. The group, led by Dr Kate Philip, recommended that emergency relief be provided to this vulnerable group through a top-up to the Child Support Grant (CSG) rather than through unemployment benefits or new targeted grants. The CSG has the advantage, they argued, of being part of government's existing social grant infrastructure and reaches 80% of individuals who are in informal worker households.

The research is one of several projects undertaken by SALDRU in recent months, working hand-in-hand with government to develop effective policy responses to the pandemic.

According to Prof Leibbrandt, director of SALDRU, there is a long history of engagement between strong university research groups like SALDRU and a range of organisations including statutory bodies (such as Stats SA) and international monitoring and evaluation groups that seek to produce rigorous data and inform policy design. The ideal policy 'triangle', he says, includes national planning in government, an independent statutory body, and an expert academic research unit, where advice does not rely on cronyism and expertise and is not dependent on highly rated individual researchers, but is based on collaboration with world leaders in the field.

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59 A support system for struggling new moms

UCT's Perinatal Mental Health Project (PMHP) has launched a platform called Messages for Mothers (M4M) to bring relief to the sky-rocketing number of young mothers in low- and middle-income communities who are suffering from depression and anxiety during the COVID-19 pandemic.

A one-stop, online resource, M4M was developed in response to a dearth of targeted messaging for vulnerable mothers. Women can now find immediate help and access information on maternal and mental health, physical health, and parenting in the pandemic.

Understanding that the cost of data is also a major factor for vulnerable young mothers, M4M has made sure that shorter graphic message versions of their articles are available and uses technology to shrink their audio resources. It has also been actively campaigning for their materials to be made available on zero-rated websites and on the National Department of Health WhatsApp line.

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60 COVID-19: the risk doesn't end with death

UCT forensic scientist Dr Marise Heyns travelled all over the Western Cape during lockdown, volunteering her services at funeral homes, churches and hospitals. Why? Because COVID-19 infection risks do not disappear immediately after the death of those who succumb to it, making unaware family members and professionals vulnerable to contracting the disease.

Providing training sessions to relatives, care-givers, priests, porters, and undertakers on behalf of the Forensic Pathology Services since April, Heyns has trained over 7,000 people in how best to take care of cadavers and to negotiate often conflicting government regulations on dealing with COVID-19 remains. "Typically, we discuss the sources of contaminations, minimising contact with infected surfaces, bedding and clothing, movement of bodies from home or hospital to undertaker to cemetery or crematorium, disinfecting equipment and vehicles, handling of paperwork – and the safe disposal of medical waste," explains Heyns.

She has also collected valuable research data, which can now be analysed and translated into recommendations for future guidelines.

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61 Quick, accurate information about COVID-19

Within just two weeks of its launch, COVID-19 Stats SA – a free-to-use, mobile-friendly, public resource developed by a UCT doctoral candidate in computational neuroscience – was boasting an average of 1 500 unique visitors (UV) per day. Soon it had reached 3 000 UVs per day.

The dashboard's developer, Leen Remmelzwaal, says it was clear that a frustrated public was desperate for a comprehensive and trustworthy overview of data on the crisis that was free of any bias. Taking his project one step further, Remmelzwaal has also launched "a historical and real-time" data application programming interface for South African COVID-19 data. This means that any software developer or analyst can build their own dashboard by pulling data from corona-stats.co.za, free of charge.

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62 New centre fights fake news and its fallout

While the mission of the newly established UCT Centre for Analytics and Behavioural Change is to build healthy communities by countering online polarisation, divisive rhetoric and narrative manipulation, they had little idea that they would find themselves battling a pandemic of misinformation barely two months after launching.

To tackle the tsunami of fake news that has arrived with COVID-19, the Centre has embarked on a R6 million project. The multidisciplinary team uses social media analytics to track and counter the spread of misinformation about the disease in South Africa. It's also built a predictive model that tracks the use of specific terms and uses thresholds to predict the likelihood of collective violence outbreaks.

"The intention is that a better understanding of how people are reacting will provide insight for public and private sector intervention. The hope is that this will bring humanity together, and therefore better poised to deal with other global problems," say Centre founders Associate Professor Camaren Peter and Stuart Jones.

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63 Fake news puts more lives at risk

Contaminated COVID-19 test kits and Americans testing vaccines in Africa – these are just two of the now familiar fake news stories that have been circulating since the pandemic hit earlier this year. Misinformation has grown at such an alarming rate, authorities like the World Health Organization (WHO) have warned its spread is putting lives at risk, and governments are criminalising it.

UCT's Herman Wasserman, professor of Media Studies, has shown that the South African media has performed relatively well, taking a careful path between collaborating with the government where justified – such as informing the public of lockdown measures – and acting as a watchdog, noting both roles are critical. Social media, however, lends itself to the circulation of unverified information.

And because the ability to create and spread information on these platforms is within the reach of most people, the burden to contain fake news is shared. "We all have a responsibility to scrutinise the information we receive and think very carefully before sharing [it]," says Wasserman.

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64 Access to information can save lives

Information saves lives. And in a 21st century pandemic, that requires access to data. This was all that was needed to inspire Professor Salome Maswime, head of UCT's Division of Global Surgery, and her team to find ways to provide communities with accurate information that was also access friendly.

Providing low-cost, low-bandwidth digital solutions may seem like an odd fit for the Division of Global Surgery, but as Maswime explains, "we have three arms: education, research and implementation. A big part of implementation is practical projects to improve service delivery and health literacy."

Their first platform could be accessed by simply punching in a USSD code on any mobile phone – not necessarily a smartphone – to get basic COVID-19 information without using any data. This project was followed by a digital tool designed to help people self-assess their COVID-19 symptoms and government to pinpoint virus hotspots. These innovations, while starting out with a local focus, are now finding uptake across the continent.

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65 Why we turn to humour in a crisis

The first case of COVID-19 announced in South Africa was rapidly followed by the first joke. Humour is often the first port of call when South Africans find themselves in stormy seas but – as Professor of Media Studies, Herman Wasserman, points out – there is a serious side to all the silliness.

Humour is a form of social and political commentary that can provide alternatives to official communication and help build community. In some instances, it is a way of showing disillusionment with government and poking fun at authority. Laughter and humour are also coping mechanisms, and help people deal with the fear and panic surrounding a global crisis, says Wasserman. However, he cautions that the prevalence of jokes and satire can become counter-productive and party to spreading misinformation, as audiences don't always know what information to trust and what to just laugh about.

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THEME 2: how much do we know about the virus?

Joining the dots

66 Africa must collaborate with the world on vaccine trials

The world seldom faces in Africa's direction when seeking solutions to the crucial problems confronting humanity. Many of the solutions to African problems remain largely of Western origin, a trend which has earned Africa the reputation of a net consumer of knowledge. This is particularly true in science, engineering and technology. COVID-19, however, presents an opportunity for African scientists to regain their place on the global stage and collaborate with colleagues around the world.

UCT Vice-Chancellor Mamokgethi Phakeng and Thokozani Majozi, professor in mathematics education in the Department of Chemical Engineering, argue that rather than fall into the passive position of vaccine guinea pigs, or side-line ourselves with an exclusive African-only approach to finding a vaccine, Africa should collaborate at all levels in global clinical trials of a COVID-19 vaccine.

There are sound medical reasons for testing such a vaccine in different communities as it has been found that a virus may develop different strains in different populations, and that humans in different countries may have different underlying conditions that cause them to respond differently to vaccine candidates. So, a vaccine that is effective in Europe may be less so in Africa or South America. Hence the World Health Organization's call for more nations to participate in its Solidarity Trial, a global study of four potential COVID-19 treatments.

If Africans were to proceed in isolation, they would risk more than lurking on the periphery of global innovation. They would risk treatments lacking efficacy at local level. And they would risk encouraging African scholars and researchers to migrate to global projects, thus slowing down research at African universities and government laboratories – research that could save lives, create jobs, and develop African economies.

When it comes to COVID-19 vaccine trials, there can be no substitute for collaboration.

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67 Putting Africa front and centre in the search for a COVID-19 vaccine

UCT is participating in three international COVID-19 vaccine trials – all of them on the World Health Organization's list of the 26 most viable candidate vaccines to enter human clinical trials.

According to one of the national principal investigators, UCT's Professor Linda-Gail Bekker, of the Desmond Tutu HIV Centre at the Institute of Infectious Disease and Molecular Medicine (IDM), "It is very important for South Africa to participate, not only because we can contribute to the global cause, but also to help scientists understand how South Africans, in all their diversity, will respond to these [vaccine] candidates, and if they do so in the same manner."

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68 COVID-19's interaction with HIV and TB investigated

A case of COVID-19 is serious enough, but what are the implications if you already suffer from a pre-existing condition such as HIV or TB? The HIATUS study, launched by UCT's Wellcome Centre for Infectious Diseases Research in Africa (CIDRI-Africa), aims to plug this knowledge gap.

The study, taking place at Groote Schuur Hospital, Site B Community Health Centre in Khayelitsha, and Livingstone Hospital in Port Elizabeth, will inform medical practitioners' understanding of the clinical manifestations and pathogenesis of COVID-19, and their implications for TB and HIV patients so as to develop better strategies to stop the spread and improve treatment.

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69 A quick fix to keep healthcare workers safe from COVID-19

Could an existing vaccine already given safely to millions of people around the world be effective in combatting COVID-19?

Scientists from UCT and Wits launched a clinical trial to test whether the vaccine for measles, mumps and rubella (MMR) could protect healthcare workers from COVID-19 or reduce the severity of illness for those infected.

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70 Harnessing plant power to curb COVID-19

A global partnership has been launched by Cape Bio Pharms, a biotech company with its origins in UCT's Biopharming Research Unit, to create an antibody test for COVID-19 using Nicotiana benthamiana, a relative of the tobacco plant.

Using the plant as a small factory to rapidly produce COVID-19 proteins and antibodies for use in vaccines and diagnostics, gives South African scientists access to safe, reliable, and affordable research reagents enabling more medical innovations on our shores.

"The research and development that results from reliable reagents are what can contribute to fighting pandemics and eventually saving lives." says Cape Bio Pharms' Tamlyn Shaw.

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71 Making sure that history doesn't repeat itself

The world of 2020 is very different to that of 1918 yet the ways in which viruses behave and humans respond have not changed much. That's why there are still important lessons to be learnt from the 1918 Spanish flu, which killed 6% of South Africa's population in just six weeks.

The most important lesson, says Howard Philips, emeritus professor of history at UCT, is to do with quarantining people infected with the virus, and their contacts, a measure the authorities failed miserably at in 1918.

South Africa needs to ensure that precautionary measures are rigorously implemented. If not, by the end of this year the *Cape Times* may be echoing what it wrote in the midst of The Spanish Flu, that the Department of Public Health had ... "lamentably failed in rising promptly and effectively to the emergency ... Instead of showing itself the provident and well-prepared authority that we have a right to expect ... it showed a lack of imagination and initiative that were wholly deplorable."

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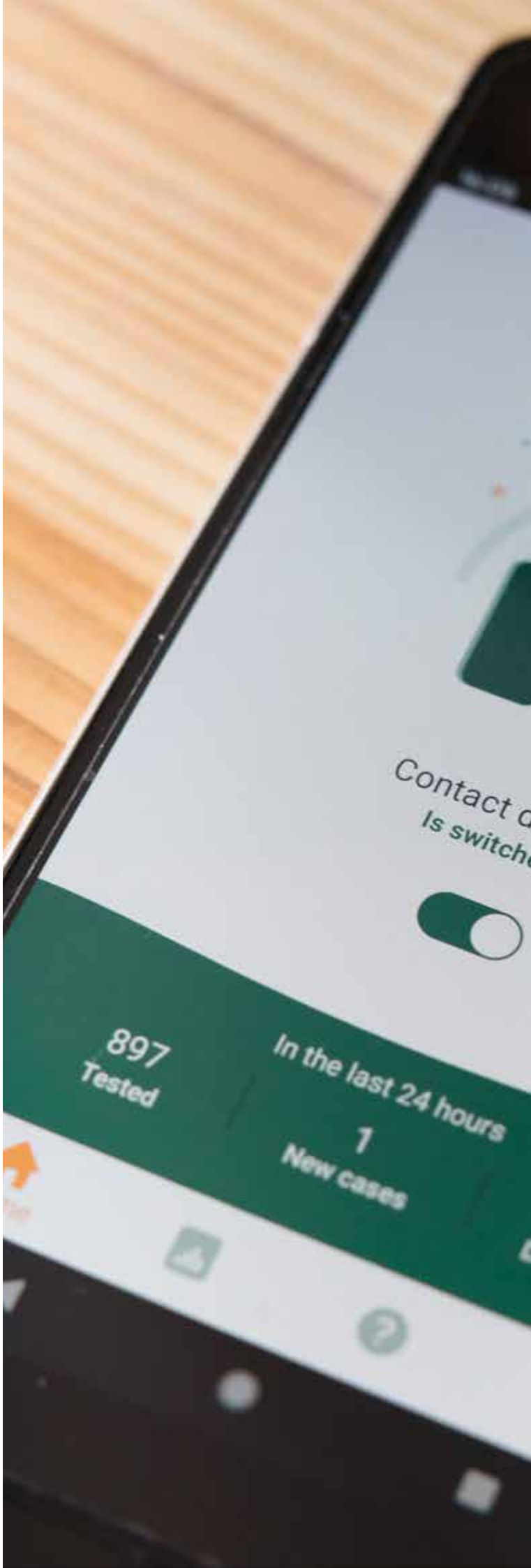

72 Convalescent plasma – a possible COVID-19 therapy

South Africa's Blood Transfusion Services (SANBS) CEO, Dr Jonathan Louw, one of the first people diagnosed with COVID-19 in South Africa, is giving back by making the country's first convalescent plasma (CP) donation in a joint project with UCT.

Infusing plasma with virus-specific antibodies from donors who have recovered from COVID-19, may provide immediate transfer of passive immunity to the recipient. It's a therapy already successfully used in other epidemics and worth investigating given that around a quarter of COVID-19 patients who need oxygen for severe pneumonia may die from the disease and outcomes for those placed on ventilators are even worse.

UCT is working with SANBS and the Western Cape Blood Service to conduct the PROTECT-patient trial, designed to assess whether COVID-19 CP is safe and effective at improving clinical outcomes. "A successful trial will provide definitive evidence on whether CP should be used in our population," says Associate Professor Sean Wasserman, Department of Medicine.

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THEME 3:
how do we live beyond the pandemic?
Finding our feet in the next normal

73 Archaeology shows how ancient African societies managed pandemics

Archaeological data shows how indigenous knowledge systems helped ancient societies deal with the shock of disease.

While social coherence was the glue that held early society together, isolation and social distancing were key to their survival, states Shadreck Chirikure, a professor of Archaeology at UCT.

Communities knew that outbreaks were unpredictable, so they built their settlements in a dispersed fashion as a precaution, allowing people to stay at a distance from each other. This is evident in what is Zimbabwe today, where the Shona people in the 17th and 18th centuries isolated those suffering from infectious diseases in temporary residential structures.

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74 Gender inequality amidst COVID-19

Women in South Africa still face deeply embedded inequalities that affect their access to healthcare, education and new technology, says a new UCT study on gender equality.

Researchers focused on women in relation to food security, new digital technologies, reproductive labour, and young motherhood to better understand the ongoing challenges that women face, now exacerbated by the COVID-19 crisis.

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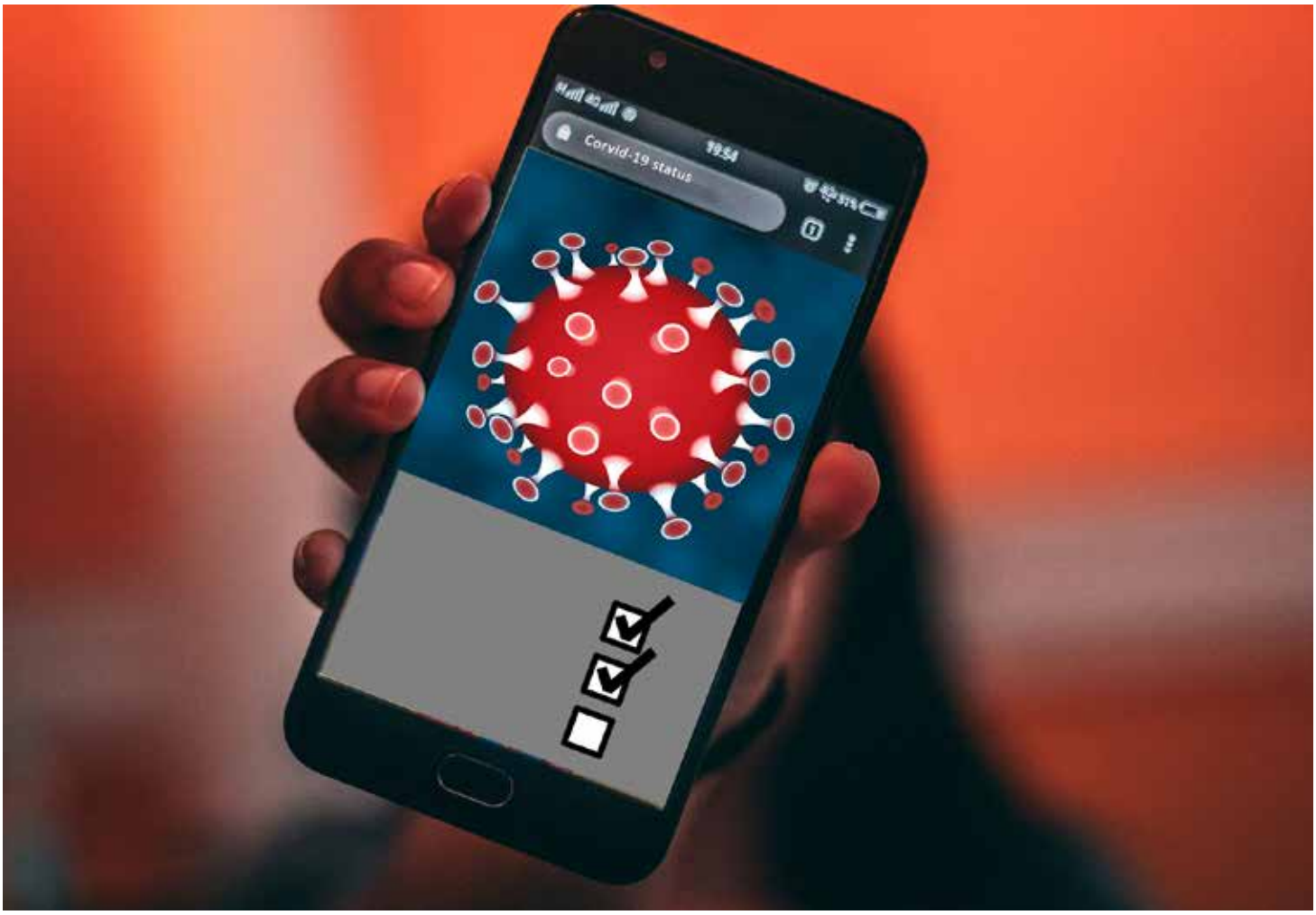

75 Innovative app could help manage future outbreaks

A group of UCT students sent home during the lockdown came up with an idea for a smartphone app that is able to verify if individuals have the virus or have recently undergone testing. These details could also be critical later on to establish that someone has been vaccinated, for instance.

"The problem with a lockdown is it works, but only for a short period of time," explains Associate Professor Co-Pierre Georg, convenor of UCT's sought-after master's in financial technology. "There's a huge demand for apps that allow governments to – among other things – trace the physical contacts a person had once they test positive for corona."

The app, called CovilD, also has additional functionality of incentivising people to practise good hygiene. Very importantly, the information is stored privately and securely. "Privacy is a human right recognised by the United Nations and we cannot sacrifice it in the interest of public health," says Georg.

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76 We need real communication now more than ever

COVID-19 has shown us how vulnerable humans really are and how presumptuous our use of language can be. Our once clever metaphors – like our aeroplanes – have been grounded. Can we ever speak lightly of having the travel bug again? Will we think twice before describing someone as having an infectious sense of humour? Will we ever again describe some facile joke on social media as 'going viral'?

While some words have been co-opted, others like 'COVID' and 'corona' will enter the human lexicon of suffering. Language innovation serves to record our hopes, but even more so our fragility, writes linguistics Professor Rajend Mesthrie, of UCT's School of African & Gender Studies.

In times of crisis, he argues it is important to pay attention to what is being said, and to listen to the voices of those most affected, especially those that lack access to the technologies of independence, information and power. "Critical language awareness helps us sort out the possible from the impossible, and the plausible from the patently false."

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77 SA's children are most at risk from lockdown

Increasing the child support grant (CSG) has never been as critical as it is now. Even before lockdowns and the widespread loss of livelihoods, before food supply chain disruptions, panic buying and stock-piling contributed to increasing food prices, the CSG was known to be insufficient to provide adequate nutrition.

A team of researchers from UCT and UWC, including UCT doctoral student Winnie Sambu, shows that close to 60% of children in South Africa live below the poverty line. This figure will be hugely exacerbated by the crisis. Nutritional shocks can result in wasting and stunting, with long-term effects on children's health and education outcomes. In addition, it was estimated that 240 000 women would be in the third trimester during the initial 21 days of hard lockdown – a critical time for the unborn children.

The most direct intervention to protect children from starvation, they conclude, is through South Africa's established social grant system: increase the value of the CSG and put food in their bellies.

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78 SA youth set back by COVID-19

A survey conducted by the UCT Graduate School of Business's Bertha Centre for Social Innovation and Entrepreneurship has revealed that over 60% of young people between 18 and 34 are very worried about COVID-19 and what the future holds for them. They are frustrated by the loss of study and job opportunities, stressed about growing debt – and by the suffocating cloud of uncertainty that makes any future planning difficult.

The survey, which was carried out in association with youth organisation Lucha Lunako and partners M4 Jam, Skills Empire and Simanye, has polled some 814 youth across the country to assess the extent of COVID-19's impact on their wellbeing. Young people are facing a disproportionately

more uncertain future than those who have had the time to develop skills and start on their careers, it found. Bertha Centre director, Dr Solange Rosa, says the survey's findings are especially important considering South Africa's high youth unemployment figure, which currently stands at just over 58%, according to Statistics South Africa.

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79 How lawful was lockdown?

Associate Professor in Public Law at UCT, Cathleen Powell, has been asking tough questions about the military police's conduct during the COVID-19 crisis.

In **The Conversation**, Powell uses the case of Collins Khosa, who was beaten to death by soldiers in Alexandra for allegedly breaking lockdown regulations, saying, "The confusion, resistance and violence accompanying the current lockdown are an object lesson on the value and necessity of the rule of law."

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80 'COVID-19 is like a war'

Comparing the economic consequences of COVID-19 to a war gives the situation the gravity and focus space it deserves, says health economist John Ataguba, an associate professor in the Health Economics Unit at UCT.

In a recently published academic paper, Ataguba argues that Africa with its high disease burden, poorly developed infrastructure and large informal economies, needs additional focus when looking at the economic implications of the pandemic. To win this war, he states, drastic steps must be taken to avoid economic crises.

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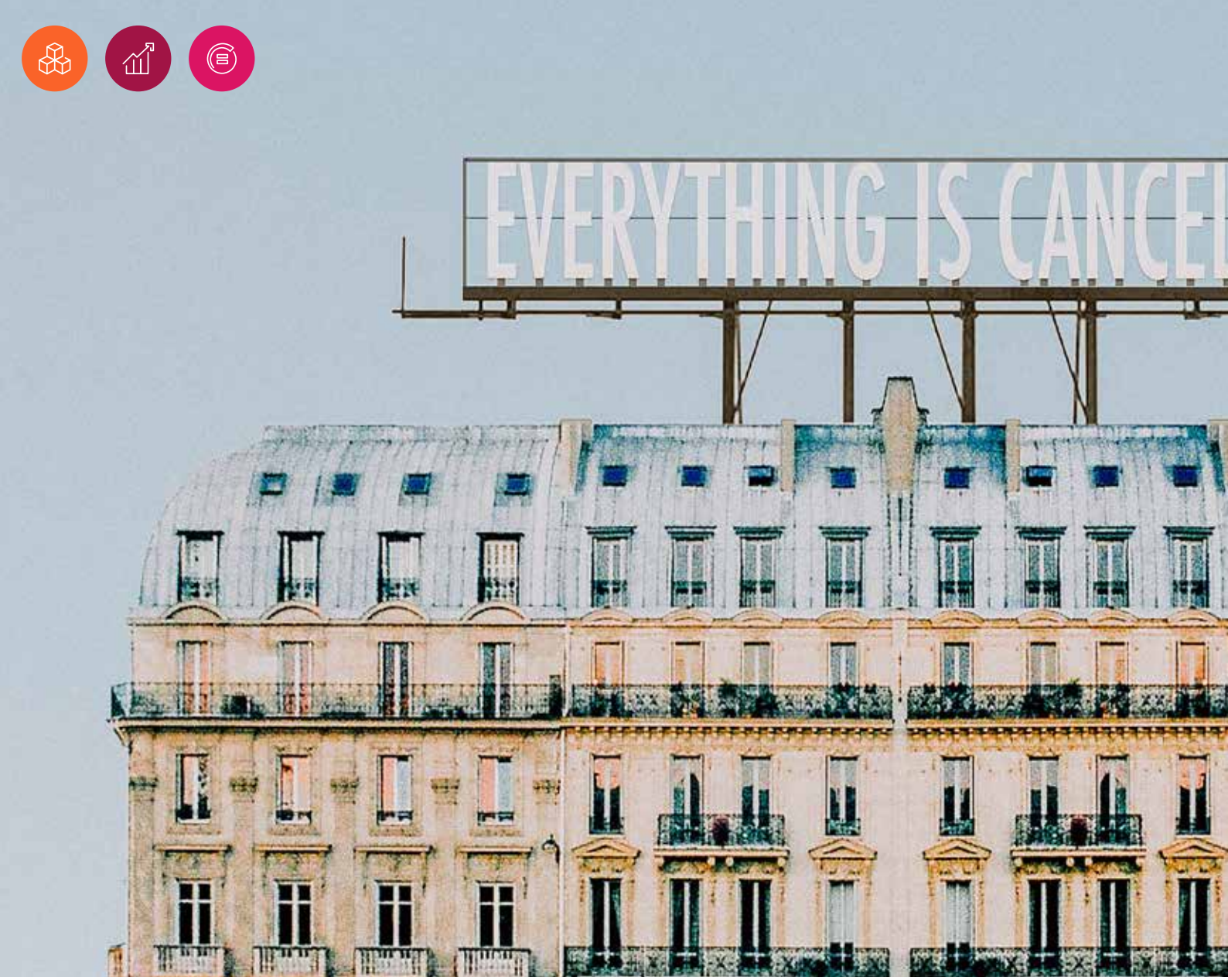

81 Long-term effects of the pandemic on business

Business leaders need to take note of the longer-term implications of the pandemic and its economic and health effects on society at large. Professor Ralph Hamann from the UCT Graduate School of Business has identified how companies and organisations will likely be affected by COVID-19 in the future.

Hamann calls on business leaders to recognise the crucial interdependencies between business and the environmental, social and governance contexts in which it operates. For example, business leaders need to pay more attention to planetary boundaries and how wild and domesticated animals are being used and exploited for food in ways that are both ethically and ecologically problematic and also highly risky to

humans. The vicious cycle of COVID-19 and poverty and social inequality has also highlighted how business needs to look after workers better and become more involved in advocating for the building of capable states.
As crises increase around the globe, businesses must become better prepared, more proactive and more responsible, he argues.

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82 New ways of making movies

South Africa's film industry may not be as big as Nigeria's, and even though it produces a steady trickle of crowd pleasers and award winners, it's not a lucrative enterprise. But COVID-19 has accelerated the development of the micro-budget film that could be key to unlocking further growth in the industry.

While the pandemic has damaged some profitable industry practices – notably hosting international film and TV productions by providing crews, finding locations and casting extras for clients – it has amplified other promising trends that offer high value from a low budget.

Micro-budget films, which are made by small crews on tight budgets are not the only COVID-19-prompted innovation, says **The Conversation**. Lockdown has bred collaboration and the production of content remotely. Actors perform scenes at home, film themselves on whatever camera they have and then upload footage for editors, and lights, camera, action … it's possible to keep producing films.

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83 How a post-COVID-19 revival could kickstart Africa's free trade area

A free trade area could become a landmark in Africa's journey towards peace, prosperity and integration and the COVID-19 pandemic, notwithstanding its devastating impact on the health and economies of Africa, could provide the impetus to set this up.

Writing in **The Conversation**, Faizel Ismail, director of the Nelson Mandela School of Public Governance at UCT, explains that Africa has been particularly vulnerable to the pandemic. Predictions are that between 300 000 and 3.3 million people could lose their lives if appropriate measures are not taken. In addition, the economic fallout could be disastrous. The COVID-19 crisis has amplified Africa's weaknesses. High levels of poverty and its concomitant realities, public debt, weak fiscal tax base, high dependency on commodity exports, high dependency

on imports for medicine and other pharmaceutical products, and the negative impact on Africa's currencies due to huge stimulus measures taken by Organisation for Economic Co-operation and Development (OECD) countries all threaten the continent's well-being.

A free trade area may have the potential to mitigate these problems, increase growth, raise welfare and stimulate industrial development on the continent. Countries could, for example, accelerate intra-regional trade by focusing on the products of greatest need during the health crisis. They could also start building regional value chains to advance industrialisation, improve infrastructure, and strengthen good governance and ethical leadership. These are all vital to not only navigating the current crisis, but also contributing to long-term prosperity.

Ismail argues that in the wake of the pandemic, African states could focus on:

- building regional value chains and partner with retailers
- stimulating regional trade by prioritising vital pharmaceutical products, personal protective equipment and food products
- taking advantage of the breakdown in supply chains from China and Europe
- restructuring clothing and textile sector to meet the needs of the health sector
- building infrastructure to support the health response
- investing in cross-border infrastructure to enable regional trade.

In addition, African states can continue to build democracy and good governance. Democratic governance supported by active citizenship creates an environment of transparency and predictability that encourages domestic and foreign investment. Both are vital for growth and industrialisation, and essential for the sustainability of regional economic integration.

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